THE CANADA SOIL INFORMATION SYSTEM (CanSIS)

MANUAL FOR DESCRIBING PERFORMANCE/ MANAGEMENT DATA

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PERFORMANCE/MANAGEMENT DATA

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<u>The Canada Soil Information System (CanSIS) Manual</u>
<u>for Describing Performance/Management Data</u>

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PURPOSE OF THE MANUAL

The soil performance/management (P/M) file of CanSIS (the Canada Soil Information System) provides a computerized system for recording data which is sufficiently comprehensive to encompass within one organizational framework all types of data relevant to soil performance. It is sufficiently flexible to allow data for a broad range of crop types and management conditions to be stored in one consistent format. This manual and the data collection forms to which it applies present an approach for recording data in a format suitable for direct computer input and storage.

To achieve this objective, the data are grouped into five major data types. Each data type exists as a separate computer file in CanSIS. The groupings of input data, as they are described in this manual, are as follows:

Location, site characteristics, past management, climate: all of these properties relate to the entire study area and are recorded in file 1.

Imposed management: this factor can be constant over the study area or may constitute a series of treatments leading to differing crop performances. This is file 7.

Soil climate: this property can relate to the entire area or can reflect observations specific to particular treatments. Observations for specific treatments are in file 3.

Soil physical and chemical properties: samples taken for analysis are frequently representative of the entire experimental area before the experiment. To determine the effects of imposed management on the soil, more intensive sampling may be required after the study. Provision is made to record data on the basis of the entire plot, groups of treatments, or individual treatments, in file 4.

Crop growth and development, production and quality: these properties can be measured over the entire area or for individual treatments and replicates. The data structure is sufficiently flexible that both of these possibilities or some intermediate combination can be accommodated in file 6.

Information in the P/M file can come from a variety of sources: detailed soil management studies, crop variety trials, soil testing laboratory files, crop insurance records, or farm surveys. While the quality and completeness of the data tend to decrease through this range, the number of sites varies from relatively few for the soil management studies to large numbers for the soil testing, crop insurance, and farm survey information. When all this information is stored in one consistent format, the reliable data can be used to develop hypotheses and recommendations and the less reliable but more numerous data can be used for verification and generalization.

RATIONALE FOR THE SOIL PERFORMANCE/MANAGEMENT FILES

Agricultural researchers, in the course of their operational and research projects, collect descriptive and observational data on many soils and in many different environmental areas. They often modify the natural environmental conditions with controlled treatments in an attempt to determine the effects upon the natural state. These effects are usually expressed in terms of physical or chemical changes in the properties of the soil, or yield and quality differences in the crop grown on the soil. The descriptive and observational data are often augmented by information from pertinent available literature as well as by detailed laboratory analyses. On the basis of such data, the researcher evaluates and makes recommendations on requirements for soil or crop management. These data thus represent one of the most comprehensive, systematic, and scientifically oriented data bases available in Canada.

In the past, some field and laboratory data were included in research reports. Experience has shown, however, that these data represent only a minor amount of the total collected or available. Large volumes of data are lost or become otherwise unavailable as personnel retire or take up other duties, or as volumes of data grow beyond manageable size.

Recognizing the need to preserve such data, the Canada Soil Survey Committee in 1970 formulated a recommendation that a national soil data system be established. Work on a system began in 1972. Since that time, the concept of the soil data bank has expanded. This manual and accompanying input documents represent the performance/management portion of the system.

The use of this manual and corresponding input forms in no way negates the necessity for careful site selection, accurate and timely observations, applications, and analyses, and overall good research practices. In fact the reverse is true, because the data will be accessible to a much larger audience than has been the case in the past. The ultimate usefulness of the system rests with those who collect and use the data.

DATA INPUT DOCUMENT

An input document is a preprinted form (or collection of forms) on which original information is recorded, and from which punched cards (or other input media) are created. For purposes of the performance/ management data files as described in this manual, the data input document consists of five separate sets of forms, each of which is tied to the overall performance/management files by a common 13-space header. Within each file there is one or more unique segment, identified by the file number and a card type number. A segment groups related data together within a file and a unique card type number is assigned. For any one small-plot experiment, input data may not be available for some segments. The researcher uses only those segments for which he has data. If data are not available for some fields within a segment, those fields should be left blank.

To use the input document properly the coder must follow the instructions as outlined in the manual. The treatment levels, data units, and variable definitions must be adhered to. Although a concerted attempt

has been made to develop a comprehensive system for Canada, it is certain that in some situations the manual and input forms will be inadequate. In such cases one could capture as much data as possible on the standard form, and record other data using the segments for special notes and interpretative comments. These free-format segments should accommodate any variable for which the form does not provide space.

Terminology definitions are not included in this manual. Definitions applicable to the portion of the document up to and including the soil morphology segment are covered thoroughly in the CanSIS Manual for Describing Soils in the Field (1978), compiled by the Working Group on Soil Survey Data. Conventional usage is assumed for agronomic terms.

STYLES OF DATA ENTRY

There are three ways in which data are entered into the input document:

1. Fixed entry

   Fixed entries are data entries of a fixed length at a fixed location on the coding form, such as location, special notes, or interpretative comments. These data are entered either by the use of codes or in free format.

2. Self-defining entry

   For self-defining entries, data are input in one of two ways:

   a. By circling an entry name (a letter followed by a series of numbers which specifies not only the field but also its value). For example, D446** describes the field "types of amendments used" and specifies "granular fertilizer." Within any one field an attempt is made to circle the best choice. Intergrade situations can be handled by circling two entries. This style of data entry is used for site description, soil classification, historical plot management, current-year plot management, and methods segments.

   b. By indicating the horizon number in which a variable is found. This is accomplished by using horizontal slashes (-) for one or more of the appropriate top six horizons (horizons 1 to 6), and vertical slashes for one or more of the appropriate lower six horizons (horizons 7 to 12). If a variable occurs in the first and seventh horizons, for example, this is indicated: ⊞▢▢▢▢▢. This style of data entry is used exclusively for profile descriptions on the form identified as Site 3E/pg 3.

3. Value-coded entry

   The data slot of a value-coded entry consists of a unique entry name (two-decimal digit) followed by a fixed-field entry. This type of entry occurs frequently in the methods segment, which appears in the margin of the input documents. A typical example appears on the form Site 7E: 55 ▭▭▭ , where 55 describes the field "total precipitation

during growing season in centimetres." The precipitation in centimetres is recorded in the space provided.

Attention is directed to data entry in the special notes and interpretative comments segments. At present, all data recorded here are in free format occupying one space per character; the data can be numerical or alphabetical, and either with or without punctuation. The purpose of these segments is to provide space for recording data that cannot be accommodated elsewhere on the form.

In that the data are recorded in free format, these segments will have minimal capability for computer search in the near future.

It should be noted that numerical data entries are right-justified and alphabetical data entries are left-justified in most fixed-entry and value-coded fields.

EXPLANATION OF THE FORM OF THE MANUAL

The descriptions and instructions in this manual have been set out in the following manner.

1. The input documents are described in five sections representing the types of information contained in the five files: site description data (file 1, Site 1E-8E); experimental treatment description (file 7, Treatment 1-4); soil temperature and moisture data (file 3, Weather 1); soil-related physical and chemical data (file 4, Soil 1-8); and crop development, yields, and quality data (file 6, Crop 1-9).

2. Within each section (file), all possible data segments are listed, to indicate the nature of the information that can be recorded.

3. The header information (which is the key information linking a data set together) and how it is to be recorded are then described.

4. The information on crop and soil observations or treatments and methods of recording them are then outlined.

RETRIEVALS

The organization of the manual reflects the segmented structure of the performance/management portion of the CanSIS system. Apart from the header information, which is numbered 1, each segment is numbered consecutively and incrementally. Data units within each segment are subdivided and assigned numbers (data field names) in a hierarchical manner. For example, 9C indicates fertilizer (macronutrients), 9C1 indicates the element nitrogen, N, and 9C11 indicates the rate of application of nitrogen. The data field names are noted in the index of data field names, appendix D. The data field names are used only to facilitate data retrieval and are of no significance to data collection and recording.

The CanSIS data base system allows the users to make information requests that will retrieve data from CanSIS data files and to produce reports using the retrieved data.

To facilitate output, all the information in the soil performance/ management file has been organized into 12 normalized relations. These relations have been defined and implemented on a data base management system called RAPID. On this system, the information is accessible to users at a computer terminal for interactive data manipulation or through various report-writing and statistical software packages. The structure of the relations in the RAPID system and the procedures for accessing the information are described in the manual on Output from the Soil Performance/ Management File of CanSIS (draft edition, 1981). The software packages used to access data include DREAM, EASYTRIEVE, and SAS.

ACKNOWLEDGMENT

FILE 1 – SITE DESCRIPTION DATA
(FORMS: SITE 1E-8E)

GENERAL

File 1 consists of the following data segments: identification, location, site description, soil classification, soil morphology, historical plot management, current-year plot management, special notes, interpretative comments, weather, and methods. These data are captured on 58 card types. Data are recorded as fixed-field, self-defining, or value-coded, the difference depending on the character of the data and the ease by which they can be captured in the field.

The methods for filling in the header key information are outlined first and then the types of data input are described for each card type.

FILE 1 CONTENTS

Card Type	Information	Form Name	Pages
All	Header Key information	Sites 1E-8E	1-8
	Type of Data Segment		
01-02	identification	Site 1E	1
03	location	Site 1E	1
04	site description	Site 1E	1
04	soil classification	Site 2E	2
05	soil morphology	Site 3E	3
04	historical plot management	Site 4E	4
04	first-year-past management	Site 5E	5
04	current plot management	Site 6E	6
58 & 04	weather and methods	Site 7E	7
06-31	special notes	Site 8E	8
32-52	interpretative comments	Site 8E	8

CODING NOTES

1. Alphabetical entries are left-justified and numerical entries are right-justified.

MIDAS		450
PHOSPHORUS		2500
NITROGEN		3000

2. Decimal places are indicated by a shaded area. If no value exists for a decimal place, a zero must be inserted.

600
300
1200

3. All header key fields must be filled in up to the card type.

1.2

THE HEADER KEY

The performance/management files are tied together by a unique
13-column header key which precedes data input on every segment used:

All data fields in the header must be completed, on each page used.

The header consists of:

1A – File number – a preprinted number ranging from 1 to 7.

1B – Province – the province in which the plot for the experiment was
located. This space requires a coded input, which appears on page A1,
appendix A; e.g., Saskatchewan is coded 03.

1C – Year – the year in which the research was conducted; e.g., 1972 is
coded 72.

1D – Project identification number – some unique five-digit number assigned
by you or your agency to your experiment.

1E – Agency number – the agency under whose auspices the plot experiment
was conducted. This space requires a coded input which appears on page A1,
appendix A; e.g., the code number for university is 3.

1F – Supervisor's initials – two initials of the research supervisor in
charge of the plot experiment.

CODING INSTRUCTIONS FOR CARD TYPES 01, 02, 03, 04, 05, AND 58

Card Type 01, Form Name: Site 1E/pg 1

	COLUMNS
IDENTIFICATION SEGMENT	16–80
PROJECT INITIATION	16–17
Two-digit code representing the year in which the project started; e.g., for 1972 code 72.	
PROJECT CESSATION	18–19
Two-digit code representing the year in which the project ended; e.g., for 1974 code 74.	
PURPOSE OF EXPERIMENT	20–80
PURPOSE	20
General purpose of project. Codes on page A1, appendix A.	

COLUMNS

TYPE	21

General type of plot experiment. Codes on
page A1, appendix A.

NAME OF PROJECT   22-80

Brief project title. Free format.
Note: title must fit within the allotted
spaces (58).

Card Type 02, Form Name: Site 1E/pg 1

COLUMNS

IDENTIFICATION SEGMENT (continued)   16-58

INCLUDED SEGMENTS AND CREDIBILITY
The data fields require a numerical code entry
showing degree of credibility. The codes are
located on page A1, appendix A.

Appropriate codes must be entered for all segments that are utilized
for your project.

Card Type 03, Form Name: Site 1E/pg 1

COLUMNS

LOCATION SEGMENT   16-30

MUNICIPALITY, COUNTY, OR DISTRICT   16-18
Depends on existing legal survey. Must be assigned
a provincially unique, numerical, three-digit code.
(To be coordinated by the province if desired.)

QTR. SECTION   19-20
Quarter-section described as NE, NW, SE, or SW.

SECTION NO.   21-22
Two-digit number, right-justified, ranging from
1 to 36.

TOWNSHIP   23-25
Actual township number is entered. Right-justified
with leading column blank.

TOWNSHIP MODIFIER   26
Alphabetical modifier used in some instances on
boundary between two different systems.

RANGE OR CONCESSION   27-28
Two-digit number, right-justified.

HEADING   29
East or West from meridian.

MERIDIAN   30
Meridian recorded by its number. Coast meridian
assigned code 9.
Note: If this survey system does not apply to your
area, leave spaces blank.

NTS MAP AREA   31-37
National Topographic System map sheet number is
entered; e.g., "54 H16 - West half" is coded as
indicated below.

PRIMARY QUAD	31-33
ALPHA DIVISION	34
NUMERIC DIVISION	35-36

DIRECTION   37
E or W for east or west half sheet, * for full
sheet.

S4	H	1.6	W	
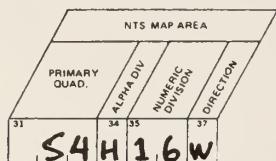
                                                            COLUMNS
PLOT CENTER – POINT LOCATION   38-64
    LATITUDE   38-44
        DEGREES   38-40
        MINUTES   41-42
        SECONDS   43-44
    LONGITUDE   45-51
        DEGREES   45-47
        MINUTES   48-49
        SECONDS   50-51
    MILITARY GRID REFERENCE   52-64
        ZONE   52-53
        ALPHA LET.   54
        100 000 METRE   55-56
        EASTING   57-60
        NORTHING   61-64
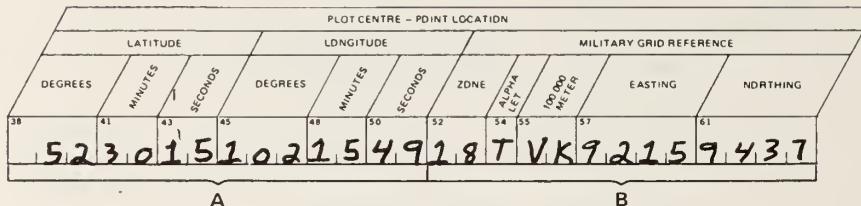
A – e.g., 52°30'15" latitude, 102°15'49" longitude.
B – Universal Transverse Mercator military grid reference,
    e.g., 18TVK92159437
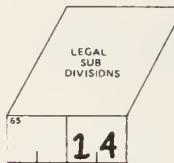
LEGAL SUBDIVISIONS
In Western Canada, each section of land can be described
in terms of legal subdivisions (LSD). Each LSD encompasses
40 acres (16 hectares). A plot occupying parts of two
LSD's can be indicated. Numerical entries are right-justified
(see description below).

Legal Subdivisions

Sections may be divided into legal subdivisions of 40
acres (16 hectares) as in diagram:

13	14	15	16
12	11	10	9
5	6	7	8
4	3	2	1

Each number indicates a legal
subdivision (LSD) within a section
of land.

Card Type 04, Form Name: Site 1E/pg 1

SITE DESCRIPTION SEGMENT

The site description segment consists of self-defining and value-coded entries; consequently column numbers are not appropriate.

Value-coded entries are filled by entering a particular numerical value in the fixed field. Note that the number of decimal places is predetermined within the field. The decimal is entered in the shaded area.

Self-defining fields are filled by circling the best choice or choices.

SITE DESCRIPTION SEGMENT

FILE	PROV	YEAR	PROJECT ID NO	AGENCY NO	SUPERV INITIAL	CARD TYPE
1	0 3	7 2	0 0 0 1 1	3 L	H	0 4

SLOPE

value-coded → 01 [2 5] • Percent slope

Slope type
A 001 ** Simple
A 002 ** Complex

Class

% slope		class
A 101 **	0−0.5	1
A 102 **	0.5 + to 2	2
(A 103 **)	2 + to 5	3
A 104 **	5 + to 9	4
A 105 **	9 + to 15	5
A 106 **	15 + to 30	6
A 107 **	30 + to 45	7
A 108 **	46 + to 70	8

self-defining →

Aspect
A 201 ** North
(A 202 **) Northeast

Card Type 04, Form Name: Site 2E/pg 2

SOIL MAP UNIT NOTATION

The purpose of this section is to record all information as it appears on a soil map.

The soil map section is completed by circling the code, indicating whether the plot site is at a location that is mapped by soil series or by soil association. The complete map notation is then entered in the fixed fields. The example codes the following map unit notation:

$$\frac{\text{E5LHy3L}}{\text{La3}}$$

Note: All entries are left-justified.

SOIL MAP UNIT NOTATION

(C 161 **) Soil series
(C 162 **) Soil association

08 [E 5] Dominant

09 [H Y 3] Significant

10 [ ] Significant

11 [3] Slope

12 [L] Texture

13 [L A] Landform

ALTERNATE SOIL MAP UNIT NOTATION
For maps where the form of the map symbol is not compatible with the fixed fields provided, the symbol information should be entered in the alternate map unit notation section. If more than 16 fields are required, use three periods as symbols for "continued" at both the end and the beginning of the break, continuing into the spaces for second or third soil area.

For subscript, e.g. E_G, code as E>G; i.e., G less than E. For superscript, E_G^T is coded as E<T>G

e.g. $\dfrac{\text{KT G SO4}}{\text{GcMb/Mg/Ma-E}_{G}^{T}\text{EF}}$ would be coded as:

ALTERNATE SOIL MAP UNIT NOTATION

Major Soil Area

72 | K.T.G.S.Φ4
73 | G.C.M.B./.M.G./.M.A.-.E.<. . . .

74 [   ] *Fraction of Area Sampled

Second Soil Area

75 [   ]
83 | . . . .T.>.G.E.F.

76 | 0 | *Fraction of Area Sampled

Third Soil Area

77 [   ]
78 [   ]

79 | 0 | *Fraction of Area Sampled

MAJOR SOIL AREA
Field 74, for the fraction of the area
sampled, is a value-coded entry.
If it is left blank the soil map unit notation
recorded will be applied to the whole sampled area.

SOIL CLASSIFICATION SEGMENT
CANADA LAND INVENTORY (CLI)

      The basic soil capability
class and soil limitations are
coded here. The entry is left-
justified.

SOIL CLASSIFICATION SEGMENT
CANADA LAND INVENTORY
1ST RATING
from
80 | 2.M | *

Soil capability   Soil limitations
class

SOIL TAXONCMY

These are self-defining entries and the appropriate codes should be circled.

Card Type 05 and Card Type 04, Form Name: Site 3E/pg 3

Form 3 is made up of card type 05 and card type 04 (cont'd.). Card type 05 is the soil morphology segment and has information encoded on layers and horizons. Card type 04 (cont'd.) is the continuation of the soil morphology segment and contains additional information on the layers and horizons that are described on card type 05.

Card Type 05, Form Name: Site 3E/pg 3

SOIL MORPHOLOGY SEGMENT

The first three basic variables, that is, layer and horizon designation, layer and horizon depth and thickness, and color, are arranged in fixed format whereby the required data are entered in fixed spaces. Layers and horizons are described beginning with the uppermost, regardless of whether or not this is organic, and proceeding downward in increasing order until all horizons are noted. The "card number" columns are to be regarded as horizon numbers. Note that a maximum of 12 layers or horizons can be accommodated. A site with more than 12 layers or horizons can be described only if certain layers or horizons are combined with others to yield a maximum of 12. For further detail on completing this segment refer to the CanSIS Manual for Describing Soils in the Field.

	COLUMNS
LAYER/HORIZON DESIGNATION	19-28
LITHOLOGICAL DISCONTINUITY	19
To express lithological discontinuity, roman numerals are converted to arabic numerals, e.g., II = 2, III = 3, etc.	
MASTER LAYER/HORIZON	20-22
Expressed in uppercase letters and always left-justified.	
SUFFIXES	23-27
Expressed in uppercase letters and always left-justified.	
MODIFIER	28
LAYER/HORIZON DEPTH AND THICKNESS	29-40
MODAL (cm)	29-34
UPPER LIMIT	29-31
LOWER LIMIT	32-34
RANGE (cm)	35-40
MINIMUM	35-37
MAXIMUM	38-40
COLOR	41-51
ASPECT	41-42
Code on page A2, appendix A	
HUE	43-47
NUMERAL	43-45
SYMBOL	46-47
VALUE	48-49
CHROMA	50-51

Note: Hue, value, and chroma represent Munsell notations. Note that numerals are right-justified (the decimal space must be filled, i.e., zeros must be recorded). The "symbol" (letter or letters) is left-justified; an unused field should remain blank.

1.8

Card Type 04, Form Name: Site 3E/pg 3

SOIL MORPHOLOGY SEGMENT (continued)

All other variables are arranged as self-defining entries (six squares beside the code for the variable). Each square refers to a layer or horizon as described in the fixed-entry fields (card type 05). The presence of a variable in any of the first six layers or horizons is indicated by marking a horizontal slash (-) in the appropriate square. The presence of a variable in any of the 7th to 12th layers or horizons is indicated with a vertical slash (|). Variables occurring in one or more of the first and one or more of the last six layers or horizons, e.g., 1st and 7th or 3rd and 9th, are indicated with a plus (+).

This entry indicates sand textures in horizons 1, 2, 3, 5, 7, 9, and 10.

This entry indicates that layers 1 to 6 inclusive have a texture of silty clay loam. If a seventh layer were present it would be recorded under 1 as a vertical slash (|) in the square opposite the appropriate textural class.

Card Type 04, Form Name: Site 4E/pg 4

HISTORICAL PLOT MANAGEMENT SEGMENT

All entries are self-defining and value-coded. The coder circles the best choice for self-defining entries and fills in the appropriate value in the fixed format of the value-coded entries. The crops portion of first-year-past management is also included on this form.

Card Type 04, Form Name: Site 5E/pg 5

FIRST-YEAR-PAST MANAGEMENT

The field entitled Fertilizer Analysis, under First-Year-Past Management (Fertilizer Macronutrients), requires some additional explanation, as follows:

The rate is a numerical right-justified value. The rate is the amount of nutrient N, P_2O_5, K_2O, or S applied.

FERTILIZER (MACRONUTRIENTS)
N:
19 ⬜ 5.0 0 ⬜ Rate (kg/ha)

The fertilizer analysis is recorded as it appears on the commercial packaging, left-justified. The hyphens occupy one column each.

FERTILIZER ANALYSIS

20 | 3 4 - 0 - 0 | ....

Placement:

(E 221**) Broadcast-soil
E 222** Broadcast-sprayed
E 223** Side band
E 224** Seed placed
E 225** Foliar applied
E 226** Injected

Incorporated:

(E 227**) Yes
E 228** No

Time of Application:

E 231** Fall
(E 232**) Spring

For Fertilizer (Micronutrients), the chemical symbol of the element is left-justified and numerical entries are right-justified.

FERTILIZER (MICRONUTRIENTS)

ONE:

27 | B | ** ← Element

28 | 0 5 0 | ← Rate (kg/ha)

29 | B O R A X | Carrier

Placement:

(E 301**) Broadcast-soil
E 302** Broadcast-sprayed
E 303** Side band
E 304** Seed placed

<u>Card Type 04, Form Name: Site 6E/pg 6</u>

CURRENT-YEAR PLOT MANAGEMENT SEGMENT

File	Province	Year	Project Id. No.	Agency	Sup. Initials	Card Type
1	0 3	7 2	0 0 0 1 1	3	L H	0 4

CURRENT YEAR PLOT MANAGEMENT SEGMENT

47 | 4 | ** No. of replicates

48 | 4 2 |* No. of treatments/repl.

A*
49 | 1 6 8 0 | Area of one replicate (sq.m.)

50 | 4 0 | Area of one treatment (sq.m.)

51 | 1 0 | Area sampled for yield and quality (sq.m.)

52 | S P R I N G F I E L D | Variety

A*: The minimum area of one replicate = area of one treatment (m^2) x number of treatments per replicate, e.g. (4.0 x 42 = 168).

The segment for current-year plot management consists of self-defining and value-coded entries. In the example, by circling F001** the coder indicates that a field-scale implement was used for preseeding tillage. Also note that value-coded entries that require numerical values are right-justified. The value-coded entry 52, which describes the field "Variety", provides space for a variety name, left-justified.

When a crop variety trial is being coded, the entry for variety is left blank. The identification segment on the form Site 1E is used to indicate that a variety trial is being coded. The variety names must then be listed in file 7 (treatments) as levels within a factor (see file 7, page 2.4 of this manual).

<u>Card Type 58, Form Name: Site 7E/pg 7</u>

<u>WEATHER SEGMENT</u>

The weather segment accommodates data that relate to the whole plot.

This segment is used to record daily air temperature, soil temperature, soil moisture, rainfall, evaporation, potential evapotranspiration, and moisture deficit.

Measurements of temperature and moisture content and amounts are associated with the date (columns 19-22) of observation.

Measurements of precipitation, evaporation, potential evapotranspiration, and moisture deficit, representing periods longer than 1 day, are associated with the period specified by starting and ending dates. Daily observations are associated with the day of observation.

<u>If soil temperature and soil moisture are measured for specific treatments, the soil temperature and soil moisture segment of file 3 (on form Weather 1/pg 13) should be used for input.</u>

	COLUMNS
CARD NUMBER	16-18

The card number is used to arrange the events in proper order. <u>These numbers are entered by the coder.</u> Each line of this form should have a different card number. Where more than one page is used, page 1 should have card numbers from 1 to 26, page 2 numbers from 27 to 52, and so on.

	COLUMNS
DATE	19-22
DAY	19-20
MONTH	21-22

The field for date (day and month) provides the common time base for all subsequent fields in the weather segment that relate to a specific card number. In the example that follows, card type 58, card number 6 indicates that on May 11 the minimum temperature was +42°F, the maximum temperature was +68°F, and there was a 1.5 h rainfall amounting to 16 mm.*

1.11

WEATHER SEGMENT

File	Province	Year	Project Id. No.	Agency	Sup. Initials	Card Type
1	03	72	00011	3	LH	58

Card Number	Date		Air Temperature		Soil Temperature			Soil Moisture			Precipitation Events in Growing Season	
					Depth (cm)		Temp.	Depth (cm)		%		
	Day	M	± Min.	± Max.	Upper	Lower	±	Upper	Lower		Dura-tion Hours	Rain-fall (mm)
16	19		23		29			38			47	
0 0 1	1 0	0 5	+ 4 5	+ 7 6	0	1 5	+ 4 7	0	1 5	3 8 2		
0 0 2					1 5	3 0	4 2	1 5	3 0	3 8 8		
0 0 3					3 0	4 5	3 8	3 0	4 5	4 0 2		
0 0 4					4 5	6 0	3 4	4 5	6 0	4 0 6		
0 0 5					6 0	9 0	3 3	6 0	9 0	4 1 0		
* 0 0 6	1 1	0 5	+ 4 2	+ 6 8							1 5	1 6
0 0 7	1 2	0 5	4 3	7 3								
0 0 8	1 3	0 5	4 8	7 5								

The date must be entered when data appear in any of the subsequent
fields. Repeating data can be indicated by an arrow, as shown in the
example.

	COLUMNS
AIR TEMPERATURE	23-28
± MINIMUM	23-25
± MAXIMUM	26-28

A positive or negative sign must be entered
for temperatures above or below zero. The
unit of measurement (^{o}F or ^{o}C) must be indicated
in the methods segment.

	COLUMNS
SOIL TEMPERATURE	29-37
DEPTH (cm)	29-34
UPPER	29-31
LOWER	32-34
± TEMPERATURE	35-37

The range of depths must be recorded for all
soil temperature measurements. The positive
or negative sign must be indicated for soil
temperature.

The unit of measurement must be circled in the
methods segment.

SOIL MOISTURE	38-46
DEPTH (cm)	38-43
UPPER	38-40
LOWER	41-43
PERCENT	44-46

The method for determining soil moisture must
be coded in the methods segment.

PRECIPITATION EVENTS IN GROWING SEASON	47-52
DURATION (HOURS)	
RAINFALL (mm)	

EVAPORATION	53-56

The unit of measurement and the method of mea-
surement must be indicated in the methods
segment.

The evaporation measurement must be expressed in
terms of the standard CDA pan. The conversion
factor applied to it is entered in entry number
54 as a value-coded entry in the methods segment.

POTENTIAL EVAPOTRANSPIRATION	57-60

Units must be indicated in the methods segment.

MOISTURE DEFICIT	61-64

Moisture deficit is coded as - (negative). If
there is an excess of moisture, code as +
(positive).

Units must be indicated in the methods segment.

PERIOD OF OBSERVATION	65-72

For measurements of precipitation, evapo-
ration, potential evapotranspiration, and
moisture deficit, which can represent amounts
accrued over an extended period of time, the
procedure for capturing this information is as
follows:

a)   the date on which the observation starts
is recorded in columns 19-22;
b)   the amount of moisture measured is recorded
in the appropriate fields of the form (between
columns 47 and 64); and
c)   the starting and ending dates with which
this measurement should be associated are entered
in columns 65-72.

<u>Card Type 04, Form Name: Site 7E/pg 7</u>

<u>METHODS SEGMENT</u>

The methods segment is designed to enable the coder to in-
dicate specific information relevant to the data in a segment. It
includes such information as measurement units and analysis methods.

<u>The importance of this information makes it imperative that all applicable
fields are indicated in the appropriate manner.</u>

The methods segment uses all three styles of data entry, as shown at A, B, and C in the following example.

Methods Segment card (left):

Header fields: File | Province | Year | Project Id No. | Agency | Sup Initials | Card Type
Values: `1` `0372` `00113` `LH` `04`

METHODS SEGMENT

AIR TEMPERATURE
Units
- 1601** Degrees celsius
- (1602**) Degrees fahrenheit ← A

SOIL TEMPERATURE
Units
- 1611** Degrees celsius
- (1612**) Degrees fahrenheit

SOIL MOISTURE
Method
- (1621**) Gravimetric (oven dry basis)
- 1622** Volumetric

EVAPORATION
Units
- 1631** Inches
- 1632** Centimeters
- 1633** Milliliters

Method
- 1641** CDA pan
- 1642** Class A pan
- 1643** Other pan
- (1644**) Vaporimeter
- 1645** Calculated

54 `5.2.4` Conversion factor to CDA pan ← B

POTENTIAL EVAPOTRANSPIRATION
Units
- 1651** Inches
- 1652** Centimeters

MOISTURE DEFICIT
Units
- 1661** Inches
- 1662** Centimeters

55 `.1.2.5` Total precipitation during growing season in cm.

61 `2.CM` Agro Climate Area

Climate Reference Station
56 `SASKATOON` ← C

WEATHER SEGMENT card (right):

Header fields: File | Province | Year | Project Id No. | Agency | Sup Initials | Card Type
Values: `1` `0372` `00113` `LH` `58`

Card Number	Date		Air Temperature			Soil Temperature				Soil Moisture			Precipitation Events — Growing Season	
						Depth (cm)		Temp		Depth (cm)				
	Day	M	±	Min	± Max	Upper	Lower	±		Upper	Lower		Duration Hours	Rain fall (mm)
16	19		23			29				38			47	
0,0,1	1,0	0,5	+	4,5	+ 7,6	,0	,1,5	+ 4,7		,0	,1,5	3,8,2		
2						,1,5	,3,0	4,2		1,5	,3,0	3,8,8		
3						,3,0	,4,5	3,8		3,0	,4,5	4,0,2		
4						,4,5	,6,0	3,4		4,5	,6,0	4,0,6		
5						,6,0	,9,0	3,3		6,0	,9,0	4,1,0		
6	1,1	0,5	+	4,2	+ 6,8								,1,5	,1,6
7	1,2			4,3	7,3									
8	1,3			4,8	7,5									

A – Self-defining: Circle the entry name that identifies the appropriate field or value.

B – Value-coded: Enter the value in the fixed field. The value is right-justified. The shaded field is for decimal places and must be filled in if anything is coded in this field.

C – Free format: Alphabetical entry, left-justified.

61 AGROCLIMATIC AREA
This field is for the capability classification based on
climatic factors
Roman numerals must be replaced by arabic. The entry is
left-justified.

56 CLIMATE REFERENCE STATION
The nearest relevant climatic reference station is entered.
The entry may be used to relate data from a climate station
to observations at the research site. This should be the
station most representative of the climate at the site
described.

SPECIAL NOTES AND INTERPRETATIVE COMMENTS SEGMENTS

Card Types 6-15, Form Name: Site 8E/pg 8

SPECIAL NOTES (FREE FORMAT)

The special notes segment is arranged to accommodate free-format
entries. The purpose of the segment is to provide for input of additional
information pertinent to the plot experiment but not requiring detailed
tabulation. The special notes segment can also accommodate information
not entered in the detailed forms.

The output from the special notes segment is in paragraph form and,
therefore, retrievals cannot be made on specific types of information.
A specific value recorded in the special notes segment cannot be re-
trieved by the computer and manipulated with data from other segments.

An example of data entry in the special notes segment is given below.

Card Type	SPECIAL NOTES (free format)
0 6	AVADEX WAS APPLIED TO ALL TREATMENTS FOR WILD OAT CONTROL
0 7	ALL TREATMENTS RECIEVED SEED-PLACED AMMONIUM PHOSPHATE AT 40 LBS
0 8	PER ACRE
0 9	
1 0	
1 1	
1 2	
1 3	
1 4	
1 5	

Card Types 32-42   Form Name: Site 8E/pg 8

INTERPRETATIVE COMMENTS

The interpretative comments segment provides for input and retrieval of the researcher's general interpretation of causes and effects, based on his input data. Comments should be straightforward and concise. Information is recorded using uppercase letters and consecutive sentences or paragraphs. Leave one space between words. A punctuation mark occupies one space.

The output is in paragraph form, in the same form as it appears on the input document.

Card Type	INTERPRETATIVE COMMENTS (free format)
3 2	THE LEVEL OF NITROGEN AVAILABLE FOR PLANT GROWTH IS A MAJOR
3 3	FACTOR INFLUENCING YIELD OF IRRIGATED SOFT WHEAT.
3 4	
3 5	
3 6	
3 7	
3 8	
3 9	
4 0	
4 1	
4 2	

FILE 7:   TREATMENTS ENCODED USING THE FACTOR-LEVEL TECHNIQUE
(FORMS: TREATMENT 1-4)

File 7 is the recommended format for coding information related to imposed management and experimental treatments. (In an earlier version of the data input forms this information was coded on a series of forms called file 2. File 2 forms still allow data coding in an acceptable form for computer input and manipulation but their use is discouraged as they offer less flexibility both for input and output of data.) Treatments applied to the whole plot, global treatments, can be described on forms from file 1. In some cases the amount of information that can be collected is restricted by the form. It is more desirable and efficient, however, to record all global data on forms of file 7 as these data can be described in a standard format and more completely. Both historical and current-year data can be coded in this file.

GENERAL APPROACH

The factor-level technique allows the encoding of up to six different factors, each with up to 20 levels. These factors and levels are used to specify treatments. It is necessary to decide what factors constitute treatments in the experiments, and within each factor how many levels have been used. These are then defined and described on pages 9, 10, and 11 of the forms. A factor constitutes the type of treatment that has been applied, such as nitrogen application, and within that factor the levels may be range of rates of N applied; or, for the same factor, the rate may be constant and the levels may be a range of sources of N.

Treatments consist of a combination of specific levels of the various factors. These are specified by filling in page 12 of the forms. This page simply assigns unique treatment numbers to the combination of levels of factors.

CARD TYPE

The card type is located in columns 19-20. In the factor definition segment on pages 9 and 10 of the forms, the card type numbers are replaced by factor numbers. The header key information (which uniquely identifies a record) is separated from the data by the card type or factor number.

In keeping with the previous section of the manual, the methods for filling in the header key information are outlined first and then the types of data input are described by card type or factor number (columns 19-20).

FILE 7 CONTENTS

Card Type	Information	Form Name	Pages
All	Header Key Information	Treatments 1-4	9-12
Factor number (col. 19-20)	Type of Data Segment		
01, 02, 03	factor definition	Treatment 1	9
04, 05, 06	factor definition	Treatment 2	10
Card type (col. 19-20)			
07	amendments	Treatment 3	11
08	coded treatment numbers	Treatment 4	12

CODING NOTES

1. Alphabetical entries are left-justified and numerical entries are right-justified.

M,I,D,A,S,	4,5,0
P,H,Ø,S,P,H,Ø,R,U,S,	2,5,0,0
N,I,T,R,Ø,G,E,N,	3,0,0,0

2. Decimal places are indicated by a shaded area. If no decimal exists, decimal places must be filled with zeros.

6,0,0
3,0,0
1,2,0,0

3. All header key fields must be filled in up to card type or factor number, except on page 11 of the form where association, column 18, may or may not be filled in.

THE HEADER KEY

File/Dossier	Province	Year/Année	Project Id. No. d'ident. du projet	Agency/Org.	Supervisor –Init.– surveillant
1	2	4	6	11	12
7	0 3	7 2	0 0 0 2 1	3	L H

1A 1B   1C   1D   1E   1F

Plus additional information depending on form (see note on page 2.3).

All data fields in the header must be completed on each page used.

The header consists of:

1A – File number – a preprinted number ranging from 1 to 7.

1B – Province – the province in which the plot for the experiment was located. This space requires a coded input, which appears on page A1, appendix A; e.g., Saskatchewan is coded 03.

1C – Year – the year in which the research was conducted; e.g., 1972 is coded 72.

1D – Project identification number – some unique five-digit number assigned by you or your agency to your experiment.

1E – Agency number – the agency under whose auspices the plot experiment was conducted. This space requires a coded input which appears on page A1, appendix A; e.g., the code number for university is 3.

1F – Supervisor's initials – two initials of the research supervisor in charge of the plot experiment.

Note

On the forms for the factor definition segment (Treatment 1/pg 9 and Treatment 2/pg 10), the header key also includes columns 14-18 up to but not including the factor number.

On the form for soil amendment description (Treatment 3/pg 11), the header key also includes factor number (column 14) and level number (column 15-17). Association does not have to be coded.

On the form for treatment description (Treatment 4/pg 12), the header key also includes the coded treatment number (columns 15-17).

CODING INSTRUCTIONS FOR ENCODING TREATMENTS USING THE FACTOR-LEVEL TECHNIQUE (Factor numbers 01, 02, 03, 04, 05, 06, and card types 07 and 08)

Factor Numbers 01-06,   Form Names: Treatment 1/pg 9 and 2/pg 10

FACTOR DEFINITION SEGMENT

There is no restriction on what items may be used as factors or levels. For illustration of the use of factors, see page 2.7 of this manual. In order to maintain some consistency, it is suggested that where any of the items listed in file 1 constitute factors, they be coded as follows:

a)   Where the factor appears as a heading in file 1 (for example, soil moisture and drainage), use the heading directly up to the first 12 characters or spaces (for example, soil moisture; see Appendix A13 for a listing of the recommended headings).

b)   Where the factor appears as a self-defining entry, the code is entered in fields 23 to 34 (on the forms at page 9 or 10) to characterize the factor. A brief explanation of the code should follow in the free-format section, in fields 38 to 80, for each factor.

c)   Factors that take the form of soil amendments should be described on page 11 of the forms, and the levels within these factors specified. Their first 12 characters should also be encoded as factors on pages 9 and 10 of the forms, using class names such as herbicide and/or fungicide in the factor code section (columns 23 to 34); the exact names of the herbicide and/or fungicide may be coded in the levels section using the first 12 characters of the name; a brief description of the factors should be inserted in free format. The number of levels should be specified, but it is not necessary to recode the levels on pages 9 and 10 if they are coded on page 11 of the forms. The purpose of this record is to give a quick summary of the variable factors in an experiment in a standardized form.

d)   Any other factors not covered by these instructions should be entered in free format. In order to retain search capability the entries in this field should be as uniform as possible. It is advisable to check with the CanSIS project leader at L.R.R.I., Ottawa, for advice on the form and type of free-format entries to be used.

The number of levels within a factor is encoded after each factor (columns 35-36). For an example of the use of levels, see page 2.6 of this manual.

In experiments where the levels cannot be conveniently described as soil amendments, the levels within a factor should be encoded below that factor (level codes, columns 23-34) on one of the forms (page 9 or 10). Abbreviations that are relatively self-explanatory should preferably be used for the levels. Where possible, an additional explanation of the level (e.g., units, abbreviations, etc.) may be included with the description of the factor in fields 38 to 80, the free-format section. Where more space is required, these explanations are best given in the special notes section, on the form identified as Site 8E/pg 8, or in the interpretive comments section on the same form. Where levels may be described as an amendment, only the number of levels is noted on pages 9 and 10 of the forms; description of individual levels is provided on page 11.

In some cases, two aspects of a factor may be studied in one experiment, for example, fertilizer rate and source, or herbicide rate and crop growth stage at the time of application. In this case one factor has two or more sets of levels associated with it. This situation is managed by using a different factor number for each set of levels and linking all levels that refer to the same factor by noting the numbers of linked factors in column 37.

Example Coded Using the Factor-Level Technique

The following example should illustrate most of the procedures for coding treatments by the factor-level technique.

Consider a fertilizer trial studying rates and sources of nitrogen on stubble and fallow with two crops, wheat and rapeseed, on dryland and under irrigation. The following treatments were applied:

- Phosphate was applied at 40 lb/acre to wheat and 30 lb/acre to rapeseed, source 11-55-0.

- Nitrogen was applied at rates of 0, 50, and 100 lb/acre, sources ammonium nitrate and urea; the 100 lb rate was also applied as a split treatment. No potash or sulfur was applied.

- Irrigation was applied to wheat on June 25 at 2.5 cm, and on July 15 at 3.6 cm; it was applied to rapeseed on June 29 at 3.2 cm, and on July 24 at 4.3 cm.

- The wheat was sprayed with carbyne on June 15 at 4.5 oz/acre and the rapeseed with TCA on May 29 at 3 lb/acre.

- The whole area of the experiment was sprayed with malathion on June 20, with active ingredient at 12 oz/acre, and again on July 10, at 10 oz/acre.

In this example five separate factors must be considered. The first step is to outline the factors by name and number of levels associated with each, and to note any factors that are linked together. This is outlined in the factor definition segment.

Explanation of the factor codes

Factor 1 - Previous crops grown   Levels - Stubble and fallow
Factor 2 - Current crops   Levels - Wheat and rapeseed
Factor 3 - Nitrogen source   Levels - Ammonium nitrate and urea
Factor 4 - Nitrogen rate   Levels - 0, 50, 100, and 50 plus 50
                                                1b/ac
Factor 5 - Irrigation   Levels - Dryland and irrigated

Notes: Factor 1

The factor "Previous crops grown" appears as a heading in file 1. It is therefore coded as CROPS GROWN, as shown in the list in appendix A13. The free-format section of factor 1 (columns 38-80) is used to explain the use of the cropped land. See example 1-1, page 2.6 of the manual.

Past land use, the subject of factor 1, does not constitute an amendment to the soil; therefore, its associated levels are described on page 9 of the forms. The levels are defined first by using the appropriate codes from file 1 for previous crops grown and then by giving a brief free-format explanation. Also, to code this information in file 1 both types of previous land use would be circled on the form Site 5E/pg 5. See example 1-2, page 2.6.

If the level codes are coded here, they are filled in as a record only. They are not defined as an amendment and appear only here, not on page 11, form Treatment 3.

Factors 3 and 4

Factors 03 and 04 are related; both the factors have nitrogen as their factor code. Their levels are different, in that factor number 03 has sources (ammonium nitrate and urea) as levels and factor number 04 has various rates of application and one split as the levels. These two factors are related on form 9 where factor 03 is described; below the factor code column 37 provides space to indicate in what factor additional properties are defined. See examples 1-1, page 2.6 and 1-3, page 2.7.

| Additional properties of this amendment are defined in factor | 37 |
| D'autres propriétés de cet amendement sont définies dans le facteur | 4 |

2.6

Examples 1-1 and 1-2 Factor definition

FACTOR DEFINITION SEGMENT
DÉFINITION DU FACTEUR

A – Levels described on form Treatment 3/pg 11.

B – Levels not described on form Treatment 3/pg 11.

C – Codes from file 1.

Example 1-3 Factor definition

FACTOR DEFINITION SEGMENT
DÉFINITION DU FACTEUR

Example 1-3 Factor definition

0121 33 (11 78) Traitement/Treatment 2 pg 10

Card Type 07, Form Name: Treatment 3/pg 11

SOIL AMENDMENT DESCRIPTION (columns 21-69)

Amendments refer to treatments that are applied to the soil, the seed, or the crop. On the soil amendment description form all amendments should be recorded including all data that have such properties as rate, time of application, and placement associated with them. The form can be used to describe crop variety, seeding rate and date; fertilizer applications; organic amendments; application of pesticides and irrigation water; and similar data.

Factors consisting of amendments are specified, with detail covering each level, on the forms at page 11. It does not matter whether the specified rate of a particular amendment is applied to one or several treatments, or to the whole plot. The sections of the plot to which a particular level of a soil amendment is applied are specified on page 12, form Treatment 4.

In the example (page 2.6), past land use does not constitute an amendment to factor 1, and its associated levels are described on page 9 of the forms. Factors 2-5 can be considered as amendments of sorts and have therefore been coded on the form at page 11.

The factor number from page 9 or 10 of the form is inserted in column 14 of page 11, and level numbers are inserted in columns 16-17. The latter are levels within the factor coded in column 14. In example 2, page 2.13, for factor 2 (column 14), level 1 (columns 16-17) represents the crop wheat - Manitou, and level 2 represents the crop rapeseed - Midas.

ASSOCIATION (column 18)

Association is an alphabetical listing to coordinate or associate a number of management inputs that constitute one level within a factor.

In example 2, page 2.13, it is used in three ways.

Level 1 of factor 2 represents the crop wheat; the association, column 18, uses an alphabetical listing to define the series of factors associated with this crop, that is, phosphate, nitrogen in the carrier MAP, and herbicide. Level 2 represents rapeseed, and associations A, B, C, and D represent the features general to the rapeseed plot.

Association is used (i) to describe general management for a crop type; (ii) in lines 16 and 17 of the example, to characterize the split nitrogen treatment; and (iii) in lines 19, 20, 21, and 22, to list the separate water treatments, dates, and amounts that constitute an irrigation treatment. See example 2, page 2.13.

Special Notes on Factors

Management factors that apply to the total plot area are encoded on page 11 of the forms as factor A (A for all) and listed as levels 1, 2, 3, and so on, or as associations within a level. In this example malathion was applied over the whole plot in two sprays. It is therefore encoded as factor A level 01A and 01B because the total application is the sum of

these two. If it were desirable to keep the applications completely
separate they would be listed as factor A level 01 and factor A level 02.
See example 2, page 2.13 , lines 9 and 10.

INFORMATION TYPE (column 21)

Column 21 is filled in from the code outlined in the methods section
at the left side of the form. This code indicates the type of information
to be described and identifies the codes listed in the appendix to be
used. See example 2, page 2.13.

CHEMICAL SYMBOL OR FORMULA, CROP CODE (columns 22-25)

The purpose of the field is to capture significant codes (chemical
symbols or formulas, crop codes) that characterize the information being
recorded. Where crop variety, seeding rate, and method are being recorded,
this field contains the code from form Site 6E/pg 6 that represents the
crop, for example, F021 for spring wheat. If special amendments are used
these would also be coded using the code from form Site 6E/pg 6; for
instance, for manure additions this field would contain F244. If the
amendment is a plant nutrient, it is listed in the manner normally used,
that is, oxides for phosphorus (P_2O_5) and potassium (K_2O) and chemical
symbol for other amendments, for example, N, S, MN, or CU.

TREATMENT (columns 26-37)

In the treatment code (methods) field the type of treatment is
identified. This is essentially a free-format field designed to make
the form more readable to the user. It should be used to list crop
varieties where more than one variety or crop is used in the study.
Otherwise it is best utilized to record a class name for the type of
treatment being described in the form. The following table gives some
examples of appropriate entries:

Sample Treatment Codes

Information type	Information type code (CODED)	Chemical symbol or formula (CODED)	Example of Treatment code (CODED)
Column number	21	22-25	26-37
Crop species and variety	C	F021 (self-defining entry from file 1)	GLENLEA
Fertilizer (macronutrients)	F	N (elemental symbol) P_2O_5 (formula)	NITROGEN PHOSPHORUS
Fertilizer (micronutrients)	G	MN	MANGANESE

Herbicides	H		BARBAN or CARBYNE
Insecticides	I		MALATHION
Fungicides	J		FORMALIN
Irrigation	W		IRRIGATION
Special soil	A	F244	MANURE
amendment		F234	MULCH
or management			
practice			

SOURCE CODE (columns 38-39)

In the source code field the appropriate code is entered to characterize the source or carrier for the amendment being applied to the soil. Seed quality, if the information is available, may be coded in this field. Appropriate codes for the various information types are listed in appendix A, as follows:

Information type	Appendix page
Macronutrients	A2 and A3
Micronutrients	A3, A4, and A5
Herbicides	A6
Insecticides	A7
Fungicides	A7
Crop seed source quality	A7

For source codes for compounds not contained in this list, please contact the CanSIS project leader, L.R.R.I., Ottawa and a unique code will be assigned.

PERCENT COMPOSITION (columns 40-43)

The field for percent composition is designed to allow coding of the nutrient content of fertilizer materials. All entries must be right-justified and unused decimal places must be filled in with zeros.

RATE OF APPLICATION (columns 44-48)

In the field for application rate, the amounts of amendments applied are recorded. A five-character field is provided to allow for a wide range of units and for two places of decimals. Numbers in this field must be right-justified. Unused decimal places must be filled in with zeros.

UNITS (columns 49-53)

The units field contains the units associated with the rate of application. The types of units allowed are restricted to the list in the methods section at the left side of the form at page 11. Rates originally measured in other units must be converted to the most appropriate of these units for entry into the form.

BASIS (columns 54-55)

The basis field is also associated with the rate of application:
it defines the terms in which the rate of application is expressed.
The codes are found on the left side of the form at page 11.

Note that where the rate of application is expressed as "total",
it will be assumed that the rate of application multiplied by the percent
composition will give the rate of application of active compound applied.
Exceptions to this are rates of P_2O_5 and K_2O, where it will be assumed
that the rate of application times the percent composition yields the rate
of application of the oxide.

DATE (columns 56-61)

Time (h)   columns 56-57
Day   columns 58-59
Month   columns 60-61

Columns 56-61 are set up to capture data on the time of application.
The figure on time of day may be relevant in some studies such as foliar
application of fertilizer (Hanway technique) or some herbicides.

CODE (column 62)

The codes for this field are listed in appendix A, on pages A2, for
time of fertilizer placement, and A5, for seeding. They define more
specifically how nutrients and seeds were applied.

METHOD OF APPLICATION (columns 63-64)

The method refers primarily to seeding methods, irrigation methods
(appendix A5), and pesticide application methods (pages A6, A7, A8).

PLACEMENT/INCORPORATION (columns 65-66)

Placement or incorporation is coded for fertilizer materials and
pesticides using the codes in appendix A2.

FORM OF MATERIAL (column 67)

The form of material is specified by an alphabetical code found at
the left side of the form in the methods section.

MIXTURE OR ASSOCIATION (columns 68-69)

In the field for mixture or association, codes can be used to specify
amendments applied as mixtures, for example, blended fertilizers or
fertilizer-herbicide mixtures. Refer to example 2, page 2.13, lines 2,
3, 6, and 7, and columns 22-37, 68-69. The field may also be used to
associate amendments from different factors. For example, when "fertigation"
is described it is desirable to associate the water application with the
application of nutrient; however, irrigation would probably appear as
one factor and the rate of nutrient application as another. The systems
capability for association would be used in this case to show that the
nutrient was applied in the irrigation water.

YEAR (columns 70-71)

When this field is blank it is understood that the amendments
described on page 11 of the forms are applied in the year listed in the
header code. When this is not the case (e.g., lime or tile drainage may
have been provided several years before the study), these amendments may
be noted on page 11 and the year of application recorded in columns
70-71. When this field is left blank, the year will be recorded as that
noted in the header code.

Note

Where more than one aspect of an amendment is used as a factor-level
combination (e.g., factors 3 and 4, source and rate of nitrogen; see
page 2.5) information is coded up to and including column 37 of the
treatment field for both factors 3 and 4, and subsequently only in either
factor 3 or factor 4 as appropriate. See example 2, page 2.13, lines 11,
12, and 13-17.

Example 2 Soil amendment description

LINE NO.	Factor Number (14,15)	Level Number (18)	Assoc. (19)	Card Type (21)	Info (22)	Chemical Symbol or Formula / Treatment Code (26)	Source Code (38)	% Comp. (40)	Rate of Application (44)	Units (49)	Basis (54)	Time (56)	Day (62)	Month (63)	Code (65)	Method/Placement (67,68)	Yr (70)
1	2 0 01	A	0 7	C	F O 21	MANITOU			10000.0	LB/AC			22	05	D		
2	0 1	B	0 7	F	P2Ø5	PHØSPHØRUS	0455	50.0	40		ØX		2		D	R	01
3	0 1	C	0 7	F	N	NITRØGEN	041	100	8		EL		2		D	R	01
	0 1	D	0 7	H		CARBYNE	52		46.0	0Z/AC	AC		15	06	B	S	
	0 2	A	0 7	C	F O 36	MIDAS			150 0.0	LB/AC			22	06	D		
6	0 2	B	0 7	F	P2Ø5	PHØSPHØRUS	0455 0P		3.0		ØX		2		D	R	02
7	0 2	C	0 7	F	N	NITRØGEN	041	100	6		EL		2		D	R	02
	0 2	D	0 7	H		TCA	72		3		AC		29	05	B	S	
9	A 0 1	A	0 7	I		MALATHIØN	03		1.2	0Z/AC	AC		29	05		S	
10	A 0 1	B	0 7	I		MALATHIØN	03		1.0		AC		20	06		S	
11	3 0 1		0 7	F	N	NITRØGEN	03	3.40.0									
12	3 0 2		0 7				51	46 0.0									
13	4 0 1		0 7						0 0.0	LB/AC	EL		22	05		B R	
14	0 2		0 7						5.0						3		
15	0 3		0 7						10.0								
16	0 4	A	0 7						5.0								
17	0 4	B	0 7						5.0								
	5 0 1		0 7	W		IRRIGATIØN			0	CM			25	06			
19	0 2	A	0 7						25.0				15	07	E		
20	0 2	B	0 7						35.0				29	06			
21	0 3	A	0 7						32.0				24	07			
22	0 3	B	0 7						43.0				24	07			
	0		0 7														
	0		0 7														
	0		0 7														

Card Type 08, Form Name: Treatment 4/pg 12

TREATMENT DESCRIPTION

Assignment of Unique Coded Treatment Numbers

    After all the factors and levels within those factors have been
outlined, the combinations that constitute specific treatments are arranged
on page 12 of the forms. It is on this page that the unique coded
treatment numbers are assigned for use throughout the remainder of the
forms to associate the results obtained with the appropriate combination of
levels and factors. This is done by choosing any convenient series
of three-digit numbers as coded treatment numbers, and encoding under the
appropriate factor columns the number of the levels that constitute that
treatment.

A - coded treatment number 001

    Factor 1, level 01 - fallow
    Factor 2, level 01 - Manitou wheat
    Factor 3, level 01 - nitrogen, source ammonium nitrate
    Factor 4, level 01 - nitrogen, rate 000 lb/ac
    Factor 5, level 01 - irrigation, 000 cm.

    In this section a series of numbers ranging from 900 to 999 can be
defined to describe treatments or analyses from a variety of plots. In the
example that follows, the number 901 represents all the plots on fallow and
902 all the plots on stubble; 903 represents all the wheat plots, 904 all
the wheat plots on stubble, and 905 all the rapeseed plots on fallow. In
this way treatments applying to these groupings can be described.

Coded Treatment No. No du traitement	Card Type Type de fiche	Nesting Order Factors & Levels Ordre de combinaison Facteurs et niveaux					
15	18 19	1 (21)	2 (23)	3 (25)	4 (27)	5 (29)	6 (31)
9.01	Z 0.8	0.1					
9.02	Z 0.8	0.2					
9.03	Z 0.8		0.1				
9.04	Z 0.8	0.2	0.1				
9.05	Z 0.8	0.1	0.2				

Note: Coded treatment number 900 indicates all treatments over the whole plots.

1. All treatments, all replicates (whole-plot characteristics).

Coded Treat. No. No du traitement	Replicate No de répétition
14	17
9.0.0	9.0

– whole-plot characteristic

2. An experiment with six replicates of which four were sampled would be coded as follows:

Coded Treat. No. No du traitement	Replicate No de répétition
14	17
9.0.0	9.4

– all treatments – average of four replicates

3. Specific treatment, average of four replicates.

Coded Treat. No. No du traitement	Replicate No de répétition
14	17
9.0.0	9.4

Treatment 1 – average of four replicates
Treatment 1 – average of all replicates

2.16

4.   Specific treatment, specific replicate.

– Treatment 1, replicate 2

FILE 3 – SOIL TEMPERATURE AND SOIL MOISTURE (DATA FOR SPECIFIED TREATMENTS)
(FORM: WEATHER 1)

GENERAL

The data fields in this segment duplicate many of the data fields in the weather segment on the form identified as Site 7E/pg 7. If the soil temperature and moisture measurements are characteristic of the whole plot, the form for Site 7E should be used. However, when these characteristics are treatment-dependent, or when soil temperature and moisture measurements are recorded on a treatment (or treatment and replicate) basis, the form identified as Weather 1/pg 13 should be used for data input.

SOIL TEMPERATURE and SOIL MOISTURE SEGMENT (DATA FOR SPECIFIED TREATMENTS)
TEMPÉRATURE et HUMIDITÉ DU SOL (DONNÉES POUR LES TRAITEMENTS PARTICULIERS)

File/Dossier (1)	Province (2)	Year/Année (4)	Project Id. No./No d'ident. au projet (6)	Agency/Org. Supervisor/surveillant (11 12)
3	0 3	7 4	0 0 0 2 1	3 E D

Coded Treat. No./No du traitement (14)	Replicate No de répétition (17)	Day/Jour (19)	Month/Mois (21)	Upper/Supérieure (23)	Lower/Inférieure (26)	Card Type/Type de fiche (29)	± (31)	Soil Temp./Temp. du sol	% Soil Moisture/Humidité du sol (34)
0 0 1	0 1	1 0	0 5	0 0	0 1 5	0 1	+	5 8	3 5 2
				1 5	3 0	0 1			3 7 2
				3 0	4 5	0 1			3 7 5
				4 5	6 0	0 1			3 6 3
				6 0	9 0	0 1			3 8 6
1 0 4				0 0	2 5	0 1	+	5 8	3 4 9
				1 5	3 0	0 1			3 7 3
				3 0	4 5	0 1			3 7 5
				4 5	6 0	0 1			3 6 3
				6 0	9 0	0 1			3 8 4
2 0 1				0 0	2 5	0 1	+	5 9	3 5 2
				1 5	3 0	0 1			3 7 4
				3 0	4 5	0 1			3 7 4
				4 5	6 0	0 1			3 6 0
				6 0	9 0	0 1			3 9 1
0 4				0 0	1 5	0 1	+	5 9	3 5 0
				1 5	3 0	0 1			3 2 1
				3 0	4 5	0 1			3 7 0

Coded Treat. No. (14)	Replicate (17)	Day (19)	Month (21)	Upper (23)	Lower (26)	Card Type (29)	± (31)	Soil Temp.	% Soil Moisture (34)
0 0 2	0 4	1 0	0 5	9 4 5	0 6 0	0 1			3 6 3
2 0 4				0 6 0	0 9 0	0 1			3 7 4
3 0 1				0 0 0	0 2 5	0 1	+	5 6	3 4 8

METHODS SEGMENT
MÉTHODES

File/Dossier (1)	Province (2)	Year/Année (4)	Project Id. No./No d'ident. au projet (6)	Agency/Org. Supervisor/surveillant (11 12)	Card Type/Type de fiche (14)
1	0 3	7 4	0 0 0 2 1	3 E D	0 4

SOIL TEMPERATURE	TEMPÉRATURE DU SOL
Units	Unités
°C F901**	
°F (F902**)	

SOIL MOISTURE	HUMIDITÉ DU SOL
Method	Méthode
Percent by weight (oven dry basis) (F911**)	Pourcentage en poids (séchage au fur)
Percent by volume (oven dry basis) F912**	Pourcentage en volume

3.2

The card type is located in columns 29-30 and separates the header key information (which uniquely identifies a record) from the data or observations. In keeping with the previous files, the methods for filling in the header key information are outlined first and then the types of data input are described by card type.

FILE 3 CONTENTS

Card Type	Information	Form Name	Pages
All	Header Key Information Type of Observation	Weather 1	13
01	soil temperature and soil moisture	Weather 1	13
04 file 1 methods		Weather 1	13

CODING NOTES

1. Alphabetical entries are left-justified and numerical entries are right-justified.

M I D A S							
P H Ø S P H Ø R U S					
N I T R Ø G E N					

| 4 5 0 |
| 2 5 0 0 |
| 3 0 0 0 |

2. Decimal places are indicated by a shaded area. If no value exists for a decimal place, a zero must be inserted.

| 6 0 0 |
| 3 0 0 |
| 1 2 0 0 |

3. In cases where day or month, or both, is unknown, insert two zeros in appropriate columns.

4. All header key fields must be filled in, up to the card type.

5. The methods segment at the bottom of the form must be completed.

THE HEADER KEY (columns 1-28)

The performance/management files are tied together by a unique 13-column header key which precedes data input on every segment used:

File/Dossier	Province	Year/Année	Project Id.No. No d'ident. du projet	Agency/Org.	Supervisor/Init. surveillant
1	2	4	6	11	12
3	0 3	7 2	0 0 0 1 1	3	L H
1A	1B	1C	1D	1E	1F

Coded Treat. No. No du traitement	Replicate No de répétition	Date		Depth (cm) Profondeur (cm)	
		Day Jour	Month Mois	Upper Supérieure	Lower Inférieure
14	17	19	21	23	26
0 0 1	0 1	1 0	0 5	0 0 0	0 1 5
1G	1H	1I	1I	1J	1J

All data fields in the header must be completed on each page used.

The header consists of:

1A - File number - a preprinted number ranging from 1 to 7 (column 1).

1B - Province - the province in which the plot for the experiment was located. This space requires a coded input, which appears on page A1, appendix A (column 2-3); e.g., Saskatchewan is coded 03.

1C - Year - the year in which the research was conducted; e.g., 1972 is coded 72 (columns 4-5).

1D - Project identification number - some unique five-digit number assigned by you or your agency to your experiment (columns 8-10).

1E - Agency number - the agency under whose auspices the plot experiment was conducted (column 11). This space requires a coded input which appears on page A1, appendix A; e.g., the code number for university is 3.

1F - Supervisor's initials - two initials of the research supervisor in charge of the plot experiment (columns 12-13).

In this file a coded treatment number, replicate, date, and depth form part of the unique header key.

1G   CODED TREATMENT NUMBER (columns 14-16)
Coded treatment numbers are assigned in file 7 on page 12 of the forms.

Refer to notes starting on page 2.14.

1H   REPLICATE (columns 17-18)
     See notes on page 2.15.

1I   DATE (columns 19-22)
1I1   DAY (columns 19-20)
1I2   MONTH (columns 21-22)

1J   DEPTH (cm) (columns 23-28)
1J1   UPPER (columns 23-25)
1J2   LOWER (columns 26-28)

CODING INSTRUCTIONS FOR SOIL TEMPERATURE AND SOIL MOISTURE
(Card Types 01 and 04, File 1)

Card Type 01, Form Name: Weather 1/pg 13

SOIL TEMPERATURE AND SOIL MOISTURE SEGMENT

SOIL TEMPERATURE (columns 31-33)

Units must be coded in the methods segment at the bottom of the form.

SOIL MOISTURE (columns 34-37)

The method of analysis must be coded in the methods segment at the bottom of the form.

Card Type 04 (File 1)

METHODS SEGMENT

The methods segment at the bottom of the form Weather 1/pg 13 must be completed.

SOIL TEMPERATURE UNITS - self-defining entry

SOIL MOISTURE METHOD - self-defining entry

FILE 4 - SOIL PHYSICAL AND CHEMICAL DATA
(FORMS: SOIL 1-8)

GENERAL

File 4 provides for a comprehensive description of soil physical and chemical properties. The file consists of eight card types: soil physical data segment, soil chemical data segment (general), soil chemical data segment (salinity), soil chemical data segment (macronutrients), soil chemical data segment (micronutrients), recommended fertilizer applications, and an additional soil analysis segment.

The card type is located in columns 29-30 and separates the header key information (which uniquely identifies a record) from the data or observations. For the first seven forms, analytical methods are recorded in the methods segment on the lower portion of each form. These methods are designated by means of self-defining entries and are stored in file 1. In keeping with the previous files, the methods for filling in the header key information are outlined first and then the types of data input are described by card type.

FILE 4 CONTENTS

Card Type	Information	Form Name	Pages
All	Header Key Information	Soil 1-8	14-21
	Type of Observation		
04 - File 1	methods	Soil 1-8	14-21
01 - File 4	physical data	Soil 1	14
02 - File 4	chemical data general	Soil 2	15
03 - File 4	chemical data salinity	Soil 3	16
04 - File 4	chemical data macronutrients	Soil 4	17
05 - File 4	chemical data micronutrients	Soil 5	18
06 - File 4	chemical data micronutrients	Soil 6	19
07 - File 4	soil test recommendations	Soil 7	20
08 - File 4	additional soil data	Soil 8	21

CODING NOTES

1. Alphabetical entries are left-justified and numerical entries are right-justified.

MIDAS
PHOSPHORUS
NITROGEN

450
2500
3000

2. Decimal places are indicated by a shaded area. If no value exists for a decimal place, a zero must be inserted.

600
300
1200

3. In cases where day or month, or both, is unknown, insert two zeros in appropriate columns.

4. All header key fields must be filled in, up to the card type.

5. The methods segment of the form must be coded.

THE HEADER KEY (columns 1-28)

The performance/management files are tied together by a unique 13-column header key which precedes data input on every segment used:

All data fields in the header must be completed, on each page used.

The header consists of:

1A - File number - a preprinted number ranging from 1 to 7 (column 1).

1B - Province - the province in which the plot for the experiment was located. This space requires a coded input, which appears on page A1, appendix A (columns 2-3); e.g., Saskatchewan is coded 03.

1C - Year - the year in which the research was conducted; e.g., 1972 is coded 72 (columns 4-5).

1D - Project identification number - some unique five-digit number assigned by you or your agency to your experiment (columns 6-10).

1E - Agency number - the agency under whose auspices the plot experiment was conducted (column 11). This space requires a coded input which appears on page A1, appendix A; e.g., the code number for university is 3.

1F - Supervisor's initials - two initials of the research supervisor in charge of the plot experiment (columns 12-13).

In this file a coded treatment number, replicate, date, and depth form part of the unique header key.

1G   CODED TREATMENT NUMBER (columns 14-16)
     Coded treatment numbers are assigned in file 7 on page 12.
     Refer to notes starting on page 2.14.

1H   REPLICATE (column 17-18)
     See notes on page 2.15.

1I DATE (columns 19-22)
    1I1 DAY (columns 19-20)
    1I2 MONTH (columns 21-22)

Note: If soil analysis was done in the previous year, not in the same year as the experiment, code day and month as 0000. This is given the same credibility as "date unknown." If an exact date is desired, please note it in the special notes segment of file 1, but 0000 must also be coded for day and month on the soil chemical analysis form.

1J DEPTH (cm) (columns 23-28)
    1J1 UPPER (columns 23-25)
    1J2 LOWER (columns 26-28)

Example 3 Soil physical data segment (see page 4.4)

A – Code 900 indicates the soil physical characteristics of the whole plot (all treatments).

B – Code 90 indicates all replicates.

C – Soil moisture retention - moisture percentage on an oven-dry basis.

D – Particle size analysis reported to nearest percentage point.

E – Methods segment must be coded.

<u>Example 4　Soil chemical data segment (general)</u> (see page <u>4.5</u>)

0121–33 (11/78) Sol/Soil 2/pg 15

A - Code 900 indicates all treatments.

B - Code 90 indicates all replicates.

C - Arrows indicate repeating data.

D - All numerical values are right-justified.

E - Exchangeable cations must be expressed in milliequivalents per hundred grams.

F - Methods segment must be coded.

CODING INSTRUCTIONS FOR SOIL PHYSICAL AND CHEMICAL PROPERTIES INCLUDING
        METHODS (Card Types 01, 02, 03, 04, 05, 06, 07, and 08)

    All the methods and some units of measurements for card types 01 to 08
of file 4 are encoded by circling the appropriate self-defining entry codes
on the bottom portion of the forms. This section must be completed for each
analytical procedure used.

    A complete list of the heading codes for methods is given in
appendix D.

Card Type 01, Form Name: Soil 1/pg 14
(See example 3, page 4.3)

.

COLUMNS

SOIL PHYSICAL DATA SEGMENT   31-71

SOIL MOISTURE RETENTION, percentage by weight   31-42
Sample preparation, sample state, and method must be coded
in the methods segment on bottom of the form.
PARTICLE SIZE ANALYSIS   43-68
Pretreatment, dispersion, and method must be coded in the
methods segment on bottom of the form.

BULK DENSITY, g/cm^3 69-71
Sample state and method must be coded in the methods segment.

Card Type 02, Form Name: Soil 2/pg 15
(See example 4, page 4.4)

SOIL CHEMICAL DATA SEGMENT (GENERAL) (columns 31-80)

    The methods segment is to be coded for all fields that are used, after
the field showing card type 02.

Card Type 03, Form Name: Soil 3/pg 16

COLUMNS

SOIL CHEMICAL DATA SEGMENT (SALINITY)   31-74

ELECTRICAL CONDUCTIVITY, mmhos/cm at 25^oC   31-34
Extract source and method must be coded in the methods segment
of the form.

COLUMNS

PERCENT WATER AT SATURATION   35-38
WATER EXTRACT DETERMINATION, µg/g   39-74
Methods of extract determinations must be coded in the
methods segment at the bottom of the form.

Card Type 04, Form Name: Soil 4/pg 17

SOIL CHEMICAL DATA SEGMENT (MACRONUTRIENTS) (columns 31-70)

The methods segment must be coded for all data fields that are used
after the one showing card type 04.

Card Type 05, Form Name: Soil 5/pg 18

SOIL CHEMICAL DATA SEGMENT (MICRONUTRIENTS) (columns 31-80)

The methods segment must be coded for all data fields that are used
after the one showing card type 05. Values are recorded in µg/g.

Card Type 06, Form Name: Soil 6/pg 19

SOIL CHEMICAL DATA SEGMENT (MICRONUTRIENTS CONTINUED)

The methods segment must be coded for all data fields that are used
after the one showing card type 06. Values are recorded in µg/g.

Card Type 07, Form Name: Soil 7/pg 20

COLUMNS

SOIL TEST RECOMMENDATIONS

ORGANIC MATTER, PERCENTAGE   31-34
SOIL TEST LABORATORY NUMBER   35-41
RECOMMENDED FERTILIZER APPLICATIONS   50-66
    N   50-54
    P-P_2O_5 55-58
    K-K_2O.   59-62
    Lime   63-66
Units for recommended fertilizer applications must be
coded in the methods segment at the bottom of the form,
in the area designated card type 04, file 1.

Card Type 08, Form Name: Soil 8/pg 21

ADDITIONAL SOIL ANALYSIS SEGMENT

In some cases the allowable entries in file 4 will not include all the
analyses carried out. Card type 08 has been developed to handle multiple
analyses by different methods, units that differ from the fixed ones on
card types 1 through 7, or analyses for elements and properties not
specified in the earlier card types. Card type 08 on form 21 is quite
flexible in design and should allow for the capture of most types of soil
data.

To encode data in card type 08, three items of information are
required.

1. A four-character code which characterizes the type and method of analysis being carried out.

2. The concentration or numerical representation of the result of the analysis; this may be any number from 9999.99 to 0.01.

3. A one-character code representing the units associated with this number. Where percentage units are used, it will be assumed that they are on a weight basis.

The current list of four-character codes to identify analysis type and method is given in appendix C. This list will be expanded as the need arises. Please contact this office to ensure that additions to this table are uniquely chosen.

A data entry on this form consists of an 11-column unit which is repeated four times across the page; i.e., four separate analyses may be encoded per line. If more then one line is required for the analyses at one depth and one date, the consecutive lines should have a unique number in the two columns labeled "card number."

For these data:

1. extractable Mn as measured by dithionite-citrate-bicarbonate extractant with a concentration measured at 36.25 ppm

2. selenium extracted by lithium metaborate with a concentration measured at 14.30 ppm

one would code:

Codes for units are found on the left side of the form.

FILE 6 - CROP DEVELOPMENT, YIELD, AND QUALITY DATA
(FORMS: CROP 1-9)

File 6 is the recommended format for encoding observations on crop development, yield, quality, and samples of crop parts at various growth stages. In an earlier draft of the forms, portions of this information was coded in file 5. The current format (file 6) has the following advantages:

1. An expanded range of types of samples may be encoded; for example, the above-ground portion for forage trials, leaf petioles for tissue testing, and so forth.

2. Multiple samples, or harvests, or both, can be recorded for the same plot.

3. Samples or observations of the crop at various important phenological growth stages may be recorded.

GENERAL

File 6 consists of nine card types and may be divided into two sections:

1) Pages 22 through 25 of the forms, corresponding to card types 01, 02, 03, and 04, are designed to capture observations on crop development, phenology, and damage.

2) Pages 26 through 30 of the forms, containing card types 05, 06, 07, 08, and 09, are designed to capture data from plant samples and analyses.

In this group of forms, the observations section (pages 22-25) is directly suited to observations on cereal crops. It can be used for other crops also, until more appropriate specialized forms can be developed for phenological observations on other crop types.

The card type is located in columns 29 and 30 and separates the header key information (which uniquely identifies a record) from the data or observations. In keeping with the previous files, the methods for filling in the header key information are outlined first and then the types of data input are described by card types.

FILE 6 CONTENTS

Card Type	Information	Form Name	Pages
All	Header Key Information	Crops 1-9	22-30
	Type of Observation		
01	crop development stage observations	Crop 1	22
02	seeding methods and crop emergence observations	Crop 2	23
03	free-format description	Crop 3	24
04	damage	Crop 4	25
05	yield and quality	Crop 5	26

06	elemental analysis	Crop 6	27
07	oilseed analysis	Crop 7	28
08	feed analysis	Crop 8	29
09	enzyme activity	Crop 9	30

CODING NOTES

1. Alphabetical entries are left-justified and numerical entries are right-justified.

| M I D A S |
| P H Ø S P H Ø L U S |
| N I T R Ø G E N |

| 4 5 0 |
| 2 5 0 0 |
| 3 0 0 0 |

2. Decimal places are indicated by a shaded area. If no value exists for a decimal place, a zero must be inserted.

| 6 0 0 |
| 3 0 0 |
| 1 2 0 0 |

3. In cases where the day or month, or both, is unknown, insert zeros in appropriate columns.

4. All header key fields must be filled in, up to the card type.

THE HEADER KEY (columns 1-28)

The performance/management data bank is tied together by a unique header key which precedes data input on every segment used:

File/Dossier	Province	Year/Année	Project Id. No. No d'ident. du projet	Agency/Organisme	Supervisors Init. Init. du surveillant	Sample Type Type d'échantillon	Purpose/Objet	Day/Jour	Month/Mois	Coded Treat. No. No du traitement	Replicate No de répétition
1	2	4	6	11	12	14	19	20	22	24	27
6	0 3	7 2	0 0 0 1 1	3	L H	G R A I N	M	1 1	0 8	0 0 1	9 0
1A	1B	1C	1D	1E	1F	1G	1H	1I	1J	1K	

Note: the "Date" label spans the Day/Jour and Month/Mois columns.

All data fields in the header must be completed, on each page used.

The header consists of:

1A - File number - a preprinted number ranging from 1 to 7 (column 1).

1B - Province - the province in which the plot for the experiment was located. This space requires a coded input, which appears on page A1, appendix A; e.g., Saskatchewan is coded 03 (columns 2-3).

1C - Year - the year in which the research was conducted; e.g., 1972 is coded 72 (columns 4-5).

1D – Project identification number – some unique five-digit number assigned by you or your agency to your experiment (columns 6-10).

1E – Agency number – the agency under whose auspices the plot experiment was conducted. This space requires a coded input which appears on page A1, appendix A; e.g., the code number for university is 3 (column 11).

1F – Supervisor's initials – two initials of the research supervisor in charge of the plot experiment (columns 12-13).

In this file a coded sample type, the purpose, and the sample date form part of the unique header key.

1G   SAMPLE TYPE columns 14-18
Codes for this field are listed on page A9, appendix A, to characterize the type of plant part sampled or observed. In general the researcher should select whichever code best fits his sample. For setting up the form and in the interests of consistency it is suggested (but not required) that the following codes be used:

FORMS	SAMPLE TYPE CODE
Page 22	– PHEND
Page 23	– PHEND
Page 24	– Stage of growth at which the observations were made
Page 25	– DAMAG
Page 26-30	– whichever is appropriate from appendix A9 Yield and quality

1H   PURPOSE column 19
Codes for this field are listed on page A9, appendix A. In general the researcher should select whichever code best fits his sample. For setting up the form and in the interests of consistency it is suggested (but not required) that the following codes be used:

FORMS	PURPOSE CODE
Page 22	– P
Page 23	– P
Page 24	– P to specify observation or D to specify damage
Page 25	– D damage
Page 26-30	– appropriate code from appendix page A9

1I   SAMPLE DATE columns 20-23
1I1   DAY columns 20-21
1I2   MONTH columns 22-23
Examples of some sample dates are as follows:

Card type	Sample Date
01	seeding date
02	seeding date or date at which population was assessed
03	dates of observation
04	dates of damage assessment
05-09	harvest date or quality assessment date

The above are examples of data that can be recorded.

1J   CODED TREATMENT NUMBER columns 24-26
     Numbers are as assigned on page 12 of the forms;
     also refer to notes in this manual concerning assignment of unique
     coded treatment numbers (referring to page 12 of the forms).

1K   REPLICATE columns 27-28
     See notes on page 2.15   of this manual.

     Your suggestions for additional requirements in this file are
     essential to its further development and will be appreciated.

CODING INSTRUCTIONS FOR DEVELOPMENT AND PHENOLOGICAL OBSERVATIONS (Card Types 01, 02, 03, 04, Crop 1-4)

Card Type 01, Form Name: Crop 1/pg 22

     This card allows dates of crop development stages to be recorded.

	COLUMNS
CROP DEVELOPMENT STAGES SEGMENT	34-80
SAMPLING TECHNIQUE	66

Codes are listed in appendix A8.

| STAND UNIFORMITY | 67-80 |

A subjective assessment of stand uniformity should be encoded
in free format; e.g., excellent, spotty, etc.

Card Type 02, Form Name: Crop 2/pg 23

     The card is designed for the capture of detailed observations
at seeding and emergence.

SEEDING METHODS AND CROP EMERGENCE OBSERVATIONS

	COLUMNS
SEEDING	34-39
DEPTH (cm)	34-36
ROW SPACING (cm)	37-39
METHOD CODE	40

Codes are listed in appendix A9.

| MODIFIER | 41 |

If the population is adjusted after seeding, for example,
by thinning by hand, this should be noted by coding T in column
41. Also, this column can be used for a code to describe seeding
which is found in appendix A, page A5.

| METHOD | 42-53 |

Suggested codes are listed in appendix A9.

| PLANT POPULATION (ESTIMATED) | 54-59 |

This is calculated from the seeding rate.

| PLANT POPULATION (ACTUAL) | 60-65 |

This is a number determined by field observation after
emergence.

| UNITS | 66-71 |

Suggested codes are listed in appendix A10.

| ASSESSMENT METHOD (ACTUAL) | 72-80 |

Suggested codes are listed in appendix A10.

Example 5. Seeding methods and crop emergence

File/Dossier	Province	Year/Année	Project Id. No. / No d'ident. du projet	Agency/Organisme	Supervisors Init. / Init. du surveillant	Sample Type / Type d'échantillon	Purpose/Objet	Date Day/Jour	Month/Mois	Coded Treat. No. / No du traitement	Replicate / No de répétition	Card Type / Type de fiche
1	2	4	6	11	12	14	19	20	22	24	27	29
6	04	72	ZS005	3	GR	PHEND	P	09	05	400	40	02

(A under Sample Type, B under Purpose/Objet, C under Date)

SEEDING METHODS AND
CROP EMERGENCE
OBSERVATIONS
MÉTHODES DE SEMIS ET
DONNÉES SUR LA LEVÉES
DES CULTURES

Seeding / Semis Depth (cm) / Profondeur (cm)	Row Spacing (cm) / Espace, rangées (cm)	Meth.-Code-Meth.	Modifier/Qualificatif	Method/Méthode	Plant Population (Estimated) / Population végétale (approximative)
34	37	40	41	42	54
4.0	2.8	A		DOUBDSGR	

(D under Meth.-Code, E under Method/Méthode)

A – Sample type – fixed as PHEND – see appendix A9
B – Purpose – fixed as P – see appendix A9
C – Date of detailed observations at seeding and emergence
D – Method code – appendix A9
E – Method – see appendix A9

Card Type 03, Form Name: Crop 3/pg 24

This card type allows the researcher to make brief free-format observations on the crop at various stage of development.

FREE-FORMAT DESCRIPTION

The crop condition is noted in free format in columns 31-80. These notes must be brief as the space provided is restricted to 50 spaces. Use one line of description for each unique coded treatment number or replicate number.

Card Type 04, Form Name: Crop 4/pg 25

CROP DAMAGE SEGMENT

This card is set up to capture information on the types and extent of damage the crop has suffered.

The effects of various specific types of damage, and some general ones as well, can be recorded on this form. Particularly severe types of damage or crop loss events not accommodated here may be coded on card 03 as well.

LODGING 1-9 column 41
Lodging can be recorded on a subjective scale of 1-9 where zero lodging damage is coded as 1.

If the level of crop damage is assessed in a general way, it may be recorded in the following columns.

	COLUMNS
MAJOR DAMAGE, PERCENTAGE	46-47
CAUSE	48-49
Suggested codes are listed in appendix A8.	
SIGNIFICANT DAMAGE, PERCENTAGE	50-51
CAUSE	52-53
Suggested codes are listed in appendix A8.	
DAMAGE ASSESSMENT TECHNIQUE	54-56

Code SUB if assessment is subjectively estimated, or MEA if the assessment is an actual measurement.

CODING INSTRUCTIONS FOR YIELD AND QUALITY OBSERVATIONS
(Card Types 05, 06, 07, 08, and 09, Crop 5-9)

Card Type 05, Form Name: Crop 5/pg 26

CROP YIELD AND QUALITY SEGMENT

Card type 05 is designed for standard cereal trials, with space to encode yield, protein, major elements, test weight, and grade (see example 9).

METHODS SEGMENT

Methods and units to be associated with a sample type are coded in the methods segment on the left hand side of the page. Within a sample type the methods, units, and so forth, must be kept constant and these are coded only once per record. It is possible to encode yield and quality data with different units, methods, etc. for up to five different sample types (see example 7A).

Example 7 Sample Type

Each sample type is assigned a sample type number by circling the appropriate number (see example 7A). The sample type code is then recorded in the box labeled "sample type" (columns 16-20) (see example 7B) corresponding to the sample type as encoded in the data part of the form (columns 14-18). (See example 9, page 5.8).

Additional information on units, moisture basis, and methods of reporting to be associated with a sample type is circled.

Example 8. Methods

This space used to record moisture basis adjusted to a level other than 15.5%.

Example 9. Crop yield and quality

CROP YIELD AND QUALITY SEGMENT / RENDEMENT ET QUALITÉ

This information is entered only once per sample type, regardless of how many copies of the form named crop 5 are required to complete the yield and quality data. If data are entered for a second sample type, the methods segment should be filled in again and a different sample type number should be circled.

	COLUMNS
CROP YIELD AND QUALITY SEGMENT	31-36

YIELD

Quality of yield is recorded in units specified in the methods section, at a moisture content also specified.

MOISTURE CONTENT, percentage oven-dry basis	37-39
PERCENT NITROGEN	40-43

Moisture basis should be specified in the methods segment.

PERCENT PROTEIN	44-47

Moisture basis should be specified in the methods segment. Protein will be encoded in columns 44-47 and will routinely be listed after the grade. Ranges will be added as they become part of the grading system. For example, protein in wheat will be listed as 1CWRS 13.5, where grade was encoded as 1CRS and protein was encoded as 13.5%.

ELEMENTAL ANALYSIS, PERCENT	48-62

Moisture basis should be reported in the methods segment.

TEST WEIGHT	63-69
lb/bu	63-65
g/0.5 L	66-69
WEIGHT, g/1000 KERNELS	70-73
PERCENT PLUMP KERNELS	74-76
GRADE	77-80

Since grade has only 4 columns, the codes in appendix A10 have to be used to encode it. The information is retrieved from the data file in output format.

e.g., GRADE	OUTPUT FORMAT	CODE
No. 1 Canadian western red spring wheat	1CWRS	1CRS

Card Type 06, Form Name: Crop 6/pg 27

ELEMENTAL ANALYSIS SEGMENT

Card type 06 can be used to capture detailed data on chemical elements. There is no restriction on the number of elements that may be recorded.

Card Number

Elements should be grouped on the same card number when they have been assayed on the same reporting basis and the same moisture basis. If more than six elements are analyzed, the first six will go on card number 01 (coded in columns 31 and 32 by the researcher) and the next six on card number 02, etc.

If the sample type is changed, for instance, from straw to grain, card numbers will start at 01 again (see example 10, page 5.11).   The moisture basis and other information such as methods of analysis should be specified in Special Notes on the form named Site 8E.

ELEMENTAL ANALYSIS SEGMENT

Elemental analysis data are encoded in a repeating unit consisting of an elemental identifier, a concentration field, and a units field.

ELEMENT 1

The first two columns of an element field should contain the chemical symbol for the element; e.g., MG in columns 33-34 signifies magnesium.   Then the concentration is listed and the units are coded. If the chemical symbol consists of one letter only, it is to be left-justified.

SYMBOL
Chemical symbol for element
CONCENTRATION
UNITS
Codes are found on the left-hand side of the form named Crop 6 (see example 10 page 5.11).   Other elements are to be coded as for element 1.

Card Type 07, Form Name: Crop 7/pg 28

OILSEED ANALYSIS SEGMENT

Card type 07 is used to capture data from oilseed crops.

Card Type 08, Form Name: Crop 8/pg 29

FEED ANALYSIS SEGMENT

Card type 08 contains space to record data particularly relevant to feed crops.

Card Type 09, Form Name: Crop 9/pg 30

ENZYME ACTIVITY SEGMENT

Card type 09 gives some capability to encode enzymatic activity.

It appears likely that further card types will be developed in this file to handle additional types of data, for example from forestry and horticulture. Please forward to the CanSIS project leader, L.R.R.I., Ottawa, your needs for handling additional types of data.   These will be developed as the requirements are defined.

Example 10 Elemental analysis

ELEMENT ANALYSIS SEGMENT / ANALYSE ÉLÉMENTAIRE

(See code / Voir le code)

METHODS SEGMENT / MÉTHODES

Reporting Basis	Provenance des résultats	
Individual Reps	Essai individuel	J701••
Average of Reps	Moyenne des essais repetes	J702••
Composite of Reps	Valeur composite	J703••
Moisture basis	Humidité	
Oven Dry	Séché au four	J081••
Air Dry	Séché à l'air	J082••
Adjusted to 13.5%	Amené a 13.5%	J083••
Moisture content as reported	Humidite tel qu indique	J084••
Adjusted to 15.5%	Amene a 15.5%	J085••

Unit Codes			Code des unites		
Units	Code		Unites	Code	
μg/g, ppm	A		µg/g, ppm	A	
mg/g, kg/tonne	B (ppt / Partie par 1 000)		mg/g, kg/tonne	B (Partie par 1 000)	
lb/bu	C		lb/boiss	C	
lb/ton	D		lb/tonne	D	
%	E		%	E	

0121 33 111 7B) Recolte Crop 6 (pg 27)

APPENDIXES

APPENDIX A

DATA CODES FOR AGRICULTURAL SMALL PLOT DATA (Performance/Management File)

HEADER

Province   codes for columns 2 and 3, all forms

British Columbia	01
Alberta	02
Saskatchewan	03
Manitoba	04
Ontario	05
Quebec	06
Newfoundland	07
New Brunswick	08
Nova Scotia	09
Prince Edward Island	10
Yukon Territory	11
Northwest Territories	12

Agency   code for column 11, all forms

Provincial	1
Federal	2
University	3
Industry	4
Other	5

IDENTIFICATION SEGMENT

General Purpose   code for column 20 of card type 1 on form Site 1E/pg 1

Crop variety trials	1
Fertilizer response trials	2
Micronutrient response trials	3
Soil and crop management trials	4
Soil amendment trials	5
Certified seed growing	6
Other crops on certified seed farms	7
Grower production information	8
Crop insurance	9
Soil testing	0

Type   code for column 21 of card type 1 on form Site 1E/pg 1

Field trials	1
Nonreplicated trials	2
Replicated trials	3
Other	4

Credibility   code for columns 16-58 of card type 2 on form Site 1E/pg 1

Very credible	1
Credible	2
Moderately credible	3
Credibility unknown	4

SOIL MORPHOLOGY SEGMENT

Soil Aspect	code for columns 41-42 of card type 5 on form Site 3E/pg 3
Matrix moist	01
Matrix dry	02
Exped moist	03
Exped dry	04
Inped moist	05
Inped dry	06
Crushed moist	07
Crushed dry	08
Natural wet and reduced	09
Natural wet and oxidized	10
Pressed wet and reduced	11
Pressed wet and oxidized	12
Rubbed wet and oxidized	13
Rubbed dry	14

TIME OF FERTILIZER APPLICATION

Time	code for column 62 of card type 07 on form Treatment 3/pg 11
Spring (preseeding for annuals)	1
At seeding	2
Postseeding	3
Fall	4
Summer	5
After first cut	6
After second cut	7

FERTILIZER PLACEMENT

Placement	code for columns 65-66 of card type 07 on form Treatment 3/pg 11
Broadcast or sprayed (incorporated)	A
Broadcast or sprayed (nonincorporated)	B
Side-banded	C
Seed-placed	D
Foliar-applied	E
Deep-placed	F
Injected	G
Other	H
Fertilizer seed-placed at highest rate specified. Additional as broadcast highest rate at seed placement to be put in free format in special notes	K

FERTILIZER CHEMICAL COMPOSITION: MACRONUTRIENTS
code for columns 38-39 of card type 07 on the form Treatment 3/pg 11
Source:

Compound	Formula	Code
Ammonia (anhydrous)	NH_3	01
Ammonia (aqua)	$NH_3.H_2O$	02
Ammonium nitrate	NH_4NO_3	03

Ammonium phosphate (monovalent)	$NH_4H_2PO_4$	04
Ammonium phosphate (bivalent)	$(NH_4)_2HPO_4$	05
Superphosphates	$Ca_x(H_xPO_4)_x.H_2O$	06
Ammonium sulfate	$(NH_4)_2SO_4$	21
Calcium nitrate	$Ca(NO_3)_2$	22
Potassium nitrate	KNO_3	23
Potassium chloride	KCl	31
Potassium sulfate	K_2SO_4	32
Sulfate of potash magnesia	$K_2SO_4.MgSO_4$	33
Calcium sulfate	$CaSO_4$	41
Elemental sulfur	S	42
Sodium sulfate	Na_2SO_4	43
Magnesium sulfate (Epsom salts)	$MgSO_4$	44
Urea	$CO(NH_2)_2$	51
Limestone		61
Dolomitic limestone		62
Calcitic limestone		63
Burnt lime		64
Marl		65

FERTILIZERS: MICRONUTRIENTS
for columns 38-39 of card type 07 on form Treatment 3/pg 11

Source (compound):

Copper	Formula	Code
Copper(ic) sulfate pentahydrate	$CuSO_4.5H_2O$	01
Copper(ic) sulfate monohydrate	$CuSO_4.H_2O$	02
Basic copper(ic) sulfates	$CuSO_4.3Cu(OH)_2$	03
Malachite	$CuCO_3.Cu(OH)_2$	04
Azurite	$2CuCO_3.Cu(OH)_2$	05
Cuprous oxide	Cu_2O	06
Cupric oxide	CuO	07
Chalcopyrite	$CuFeS_2$	08
Chalcosite	Cu_2S	09
Copper(ic) acetate	$Cu(C_2H_3O_2)_2.H_2O$	10
Copper(ic) oxalate	$CuC_2O_4.\frac{1}{2}H_2O$	11
Copper(ic) ammonium phosphate	$Cu(NH_4)PO_4.H_2O$	12
Copper - S fusions	CuC_2O_4-S	13
Copper chelates	$Na_2CuEDTA$	14
	$NaCuHEDTA$	
Copper polyflavonoids		15

Zinc		
Zinc sulfate monohydrate	$ZnSO_4.H_2O$	21
Zinc sulfate heptahydrate	$ZnSO_4.7H_2O$	22
Basic zinc sulfate	$ZnSO_4.4Zn(OH)_2$	23
Zinc oxide	ZnO	24

Zinc carbonate	$ZnCO_3$	25
Zinc sulfide	ZnS	26
Zinc frits	(silicates)	27
Zinc phosphate	$Zn_3(PO_4)_2$	28
Zinc chelates	$Na_2ZnEDTA$	29
	NaZnNTA	
	NaZnHEDTA	
Zn polyflavonoid		30
Zn ligninsulfonate		31

Iron

Ferrous sulfate	$FeSO_4 \cdot 7H_2O$	41
Ferric sulfate	$Fe_2(SO_4)_3 \cdot 4H_2O$	42
Ferrous oxide	FeO	43
Ferric oxide	Fe_2O_3	44
Ferrous ammonium phosphate	$Fe(NH_4)PO_4 \cdot H_2O$	45
Ferrous ammonium sulfate	$(NH_4)_2SO_4 \cdot FeSO_4 \cdot 6H_2O$	46
Iron frits	Varied	47
Iron ammonium polyphosphate	$Fe(NH_4)HP_2O_7$	48
Iron chelates	NaFeEDTA	49
	NaFeHEDTA	
	NaFeEDDHA	
	NaFeDTPA	
Iron polyflavonoids		50
Iron ligninsulfonates		51
Iron methoxyphenyl-propane	FeMPP	52

Molybdenum

Sodium molybdate	$Na_2MoO_4 \cdot 2H_2O$	61
Ammonium molybdate	$(NH_4)_6Mo_7O_{24} \cdot 4H_2O$	62
Molybdenum trioxide	MoO_3	63
Molybdenum sulfide	MoS_2	64
Molybdenum frits		65

Boron

Borax	$Na_2B_4O_7 \cdot 10H_2O$	71
Sodium pentaborate	$Na_2B_{10}O_{16} \cdot 10H_2O$	72
Sodium tetraborate: fertilizer borate - 46, fertilizer	$Na_2B_4O_7 \cdot 5H_2O$	73
borate - 65	$Na_2B_4O_7$	70
Solubor	$Na_2B_4O_7 \cdot 5H_2O$ $+ Na_2B_{10}O_{16} \cdot 10H_2O$	74
Boric acid	H_3BO_3	75
Colemanite	$Ca_2B_6O_{11} \cdot 5H_2O$	76
Boron frits		77

Manganese

Manganese sulfate	$MnSO_4 \cdot 3H_2O$	81
Manganese oxide	MnO	82
Manganese methoxy-phenylpropane	MnMPP	83

Manganese chelate	MnEDTA	84
Manganese carbonate	$MnCO_3$	85
Manganese chloride	$MnCl_2$	86
Manganese oxide	MnO_2	87
Manganese frits		88

MANURE

Note - both columns 38 and 39 must be coded

Type of Manure   code for column 38 card type 07 on form Treatment 3/pg 11
Beef	1
Pig	2
Poultry	3
Horse	4
Sheep	5
Other	6
Dairy	7

Form of Manure   code for column 39 of card type 07 on form Treatment 3/pg 11
Fresh	1
Decomposed	2
Liquid	3
Unknown	0

IRRIGATION

Irrigation Method   code for columns 63-64 of card type 07 on form Treatment 3/pg 11
Spring flood	A
Border dyke	B
Ditch	C
Furrow	D
Sprinkler	E
Side roll	F
Center pivot	G
Hand-moved	H
Trickle or drip	J

SEEDING

Seeding Method   code for columns 63-64 of card type 07 on form Treatment 3/pg 11
Double-disc drill	A
Single-disc drill	B
Hoe drill	C
Discer	D
Broadcast	E
Experimental plot seeder	F
Hand-planted	G
Other	H

Code to Describe Seeding code for column 62 of card type 07 on form
                          Treatment 3/pg 11
Cover crop	A
With cover crop	B

Without cover crop	C
Spread on the surface	D
Spread on the surface and buried	E

HERBICIDE

Chemical   code for columns 38-39 of card type 07 on form Treatment 3/pg 11

Chemical	Code
2,4-D ester	01
2,4-D amine	02
MCPA	03
2,4-DB (Embutox)	04
MCPB (Tropotox)	05
Bromoxynil (Brominil)	06
Bromoxynil & MCPA (Buctril M or Brominil M)	07
Dicamba	08
Dicamba & 2,4-D or MCPA (Banvel)	09
Dichlorprop	10
Dichlorprop & 2,4-D (Estaprop)	11
Linuron (Lorox or Afalon)	12
Niclofen (TOK RM)	13
Benazolin	14
Dinoseb amine (SINOX PE)	15
Chloramben (amiben)	16
Paraquat (Gramoxone)	17
Alachlor (Lasso)	18
Simazine (Fallow Gard)	19
Atrazine	20
Bladex	21
Basagran	22
Metolachlor/Atrazine	23
Killmore	24
Monolinuron (Afesine)	25
Estamine	26
Triallate (Avadex BW)	51
Barban (Carbyne)	52
Benzoylprop-ethyl (Endaven)	53
Difensoquat (Avenge)	54
Asulam (Asulox F)	55
Mecoprop (Compitox)	56
Glyphosate (Roundup)	57
	58
Trifluralin (Treflan)	71
TCA	72
Dalapon	73
Dinitramine (Cobex)	74
EPTC (Eptam)	75
R-25788 (Eradicane)	76
Butylate (Sutan)	77
Metobromuron (Patoran)	78
Metribuzin (Lexone, Sencor)	79
	80

Application Method   code for columns 63-64 of card type 07 on form
                     Treatment 3/pg 11
Soil-applied   A
Foliar-applied   B
Seed-applied   C

INSECTICIDES

Chemical   code for columns 38-39 of card type 07 on form Treatment 3/pg 11
Dimethoate (Cygon)   01
Demeton   02
Malathion   03
Carbaryl (Sevin)   04
Endrin   05
Leptophos (Phosvel)   06
Carbofuran (Furadan)   08
Lindane   09
Aldrin   10
Heptachlor   11
Azinphos-methyl (Guthion)   12
Trichlorfon (Dylox)   13
Methomyl (Lannate)   14
Chlorphyrifos (Lorsban)   15
Methoxychlor   16
Carbophenothion   17
Basudin (Diazinon)   18
Thimet (Phorate)   19
Disyston   20
Dieldrin   21
Dasinit (Fensulfothion)   22

Application Method   code for columns 63-64 of card type 07 on form
                     Treatment 3/pg 11
Soil-applied   A
Foliar-applied   B
Seed-applied   C

FUNGICIDES

Chemical   code for columns 38-39 of card type 07 on form Treatment 3/pg 11
Formaldehyde (Formalin)   01
Metiram (Polyram)   02
Maneb (Agrox N-M)   03
Carbathiin & Thiram (Vitaflo - 280)   04
Thiocyanomethylthio-benzothiazole
  (Busan TCMTB)   05
Mancozeb (Dithane M-45)   06
Carbathiin (Vitaflo - 250)   07
Nemacur (fenamifos)   08
Gammason   09
Milgo E   10
                                             11
                                             12

<u>Application Method</u> code for columns 63-64 of card type 07 on form
                    Treatment 3/pg 11

Soil-applied	A
Foliar-applied	B
Seed-applied	C

SEED QUALITY

<u>Source Codes</u>   code for columns 38-39 of card type 07 on form Treatment 3/pg 11

Uncertified, uncleaned, unknown quality	1
Uncertified, cleaned	2
Certified	3
Registered	4
Breeder seed	5
Foundation seed	6
<u>Corn</u>	
Single cross	7
Double cross	8
Three-way cross	9
Other cross	10

CROP DAMAGE

<u>Cause</u>   code for columns 48-49 and 52-53 of card type 04 on form Crop 4/pg 25

Adverse weather (20-29)	20
Spring frost	21
Fall frost	22
Spring drought	23
Summer drought	24
Drought	25
Snow, early-season	26
Snow, harvest	27
Hail	28
Excessive rain	29
Disease (50-59)	50
Pests (60-69)	60
Insect pests	61
Birds	62
Weeds	63
Improper use of chemicals (40-49)	40
Pesticides	41
Fertilizers	45
Adverse soil conditions	30
Other (miscellaneous)	70

CROP SAMPLING

<u>Techniques</u>   code for column 66 of card type 01 on form Crop 1/pg 22

Rod-row	1
Square metre	2
Entire plot	3
Cut strips	4

SAMPLE TYPES   code for columns 14-18 of all card types in file 6

A Crop Development Observations	CODE
Dates of phenological stages of crops	PHEND
Detailed observations on seeding	PLANT
Emergence	EMERG
Third leaf stage	3RDLF
Fifth leaf stage	5THLF
Tillering	TILLR
Heading	HEADG
Soft dough	SFTDO
Harvest	HARVT
Observation on crop damage	DAMAG
B Yield and Quality Samples	
Grain	GRAIN
Seed	SEEDS
Fruit	FRUIT
Tubers	TUBER
Straw	STRAW
Above-ground portion	ABGDP
Economic yield	ECYLD
Leaves	LEAFS
Leaves and stems	LESTM
Petioles	PETOL
Roots	ROOTS
Nodules	NODUL

This list will be incomplete and new codes may be added. When doing so please contact this office so that we are aware of the additions. These codes must be five characters in length.

PURPOSE code for column 19 of all card types in file 6

	Code
Sample for yield only	Y
Sample for yield and quality	M
Sample for tissue analysis	A
Sample for after-storage quality	S
Sample for yield or quality or both, from bulked sample of previous harvest	B
Estimated by inspector	I
Estimated by farmer	F
Observations of the crop development or dates of phenological events	P
Observation at various growth stages associated with crop damage	D

Again, this list is not exhaustive and additions may be made to it after contacting this office. As for the sample type, the purpose must be coded.

METHOD OF SEEDING code for card type 02 on form Crop 2/pg 23

Method	Code (column 40)	Coded Method (columns 42-53)
Double disc drill	A	DOUBDSCDRILL
Single disc drill	B	SINGDSCDRILL

Hoe drill	C	HOEDRILL
Discer	D	DISCER
Broadcast	E	BROADCAST
Experimental plot seeder	F	EXPTLSEEDER
Hand-planted	G	HANDPLANTED
Corn planter	J	CORNPLANTER
Broadcast with fertilizer	K	BROADCSTFERT
Other	H	OTHER

Units   code for columns 66-71 of card type 02 on form Crop 2/pg 23
Actual units

Plants per acre	ACRE
Plants per hectare	HECTAR
Plants per square metre	MSQ
Plants per square yard	YDSQ
Plants per rod of row	RODROW
Plants per metre of row	MROW
Percent	PERCNT

ASSESSMENT METHOD code for columns 72-80 of card type 02 on form Crop 2/pg 23

Germination assessment	GERMINATION
Plant counts per square yard	PL/YDSQ
Plant counts per square metre	PL/MSQ
Plant counts per metre of row	PL/MROW
Plant counts per rod of row	PL/ROD

GRADE OF GRAIN   codes for columns 77-80 of card type 05 on form Crop 5/pg 26

Grain	Output Format		Code		
WHEAT					
No. 1 Canada Western Red Spring	1CWRS		1CRS		
No. 2 Canada Western Red Spring	2CWRS		2CRS		
No. 3 Canada Western	3CWRS		3CRS		
No. 1 Canada Utility	1CU	red	1CU	R*	*Color must also
No. 2 Canada Utility	2CU	white	2CU	W*	be coded
No. 3 Canada Utility	3CU	mixed or unknown	3CU	M*	
AMBER DURUM					
No. 1 Canada Western	1AD		1AD		
No. 2 Canada Western	2AD		2AD		
No. 3 Canada Western	3AD		3AD		
No. 4 Canada Western	4AD		4AD		
No. 5 Canada Western	5AD		5AD		
RED WINTER					
No. 1 Canada Western Red Winter	1CWRW		1CRW		

Grain	Output Format	Code	
No. 2 Canada Western Red Winter	2CWRW	2CRW	
No. 3 Canada Western Red Winter	3CWRW	3CRW	

SOFT WHITE SPRING

Grain	Output Format	Code	
No. 1 Canada Western Soft White Spring	1CWSWS	1SWS	
No. 2 Canada Western Soft White Spring	2CWSWS	2SWS	
No. 3 Canada Western Soft White Spring	3CWSWS	3SWS	
No. 4 Canada Western Soft White Spring	4CWSWS	4SWS	

OATS

Grain	Output Format	Code
No. 1 Canada Western	1CW	1CW
No. 2 Canada Western	2CW	2CW
Extra No. 1 Feed	X1FEED	X1FE
No. 1 Feed	1FEED	1FEE
No. 2 Feed	2FEED	2FEE
No. 3 Feed	3FEED	3FEE

BARLEY

Grain	Output Format	Code
No. 1 Canada Western Six-Row	1CW6R	1C6R
No. 2 Canada Western Six-Row	2CW6R	2C6R
No. 1 Canada Western Two-Row	1CW2R	1C2R
No. 2 Canada Western Two-Row	2CW2R	2C2R
No. 1 Feed	1FEED	1FEE
No. 2 Feed	2FEED	2FEE
No. 3 Feed	3FEED	3FEE

RYE

Grain	Output Format	Code
No. 1 Canada Western	1CW	1CW
No. 2 Canada Western	2CW	2CW
No. 3 Canada Western	3CW	3CW
Canada Western Ergoty	Ergoty	Ergo

CORN

Grain	Output Format		Code	
No. 1 Canada Western	1CW		1CW*	*Color must
No. 2 Canada Western	2CW	yellow	2CW Y*	be coded
No. 3 Canada Western	3CW	white	3CW W*	
No. 4 Canada Western	4CW	or	4CW*	
No. 5 Canada Western	5CW	mixed	5CW M*	

EXPERIMENTAL

WHEAT

Grain	Output Format	Code
No. 1 Canada Western Experimental	1 CW EXPERIMENTAL	1CEX
No. 2 Canada Western Experimental	1 CW EXPERIMENTAL	2CEX

Grain	Output Format	Code	
BARLEY			
No. 1 Canada Western Experimental	1CW EXPERIMENTAL	1CEX	
No. 2 Canada Western Experimental	2CW EXPERIMENTAL	2CEX	
FLAXSEED			
No. 1 Canada Western	1CW	1CW	
No. 2 Canada Western	2CW	2CW	
No. 3 Canada Western	3CW	3CW	
No. 4 Canada Western	4CW	4CW	

Grain	Output Format	Code	
RAPESEED			
No. 1 Canada	1CRS	1CRS	
No. 2 Canada	2CRS	2CRS	
No. 3 Canada	3CRS	3CRS	
MUSTARD			
No. 1 Canada	1C yellow	1CY*	*Color must
No. 2 Canada	2C oriental	2CO*	be coded
No. 3 Canada	3C brown or	3CB*	
No. 4 Canada	4C mixed	4CM*	
BUCKWHEAT			
No. 1 Canada	1C	1C	
No. 2 Canada	2C	2C	
No. 3 Canada	3C	3C	
PEAS			
No. 1 Canada Western	1CW	1CW	
No. 2 Canada Western	2CW	2CW	
No. 3 Canada Western	3CW	3CW	
Extra No. 4 Canada Western	X4CW	X4CW	
No. 4 Canada Western	4CW	4CW	
SUNFLOWERS			
No. 1 Canada	1C	1C	
No. 2 Canada	2C	2C	
No. 3 Canada	3C	3C	

CODES FOR FILE 7

columns 26-37 of card type 07 on form Treatment 3/pg 11
columns 23-34 of factor numbers 1-6 on forms Treatment 1/pg 9
    and Treatment 2/pg 10
columns 23-34 of level codes forms Treatment 1/pg 9 and
    Treatment 2/pg 10

Some suggested codes to describe treatments that appear as headings in
File 1 are given below. In most cases, specific details of the treatment
can be described by using appropriate self-defining entries at the start
of the 12-character code.

12-character code for factor or level	Description
SLOPE	- used to define general aspects of slope
SOIL MOISTURE	- general aspects of soil moisture and drainage
RUNOFF	- used where runoff conditions constitute a treatment
SEEPAGE	- seepage conditions
EROSION	- several types and degrees of erosion can be defined
STONE & ROCK	- variable stoniness conditions
TEXTURE	- any texture conditions of surface, subsurface, or parent material; for use on form Site 1E not Site 3E
TAXONOMY	- soil taxonomy treatments
MORPHOLOGY	- soil morphology
LAND USE	- general type of land use
CROPS GROWN	- can summarize crops grown 2 years or more before current trial or crops in year before trial, by use of appropriate self-defining entry codes and note of the year (columns 70-71)
PEST CONTROL	- where differences in weed, insect, or disease control constitute part of the treatment
EQUIPMENT	- for scale of equipment or type of seedbed preparation
SPECIAL PROB	- special soil problems, such as salinity
MANAGEMENT	- for special soil management problems or general description of management practices
CURRENT CROP	- levels consist of species and variety of crops grown

The techniques for characterizing amendments are the same for treatments
before the trial as for those during the trial, only the date is changed
(ie. year).

APPENDIX B

SOME COMMON FERTILIZER ANALYSES AND THEIR CHEMICAL COMPOSITIONS

Analysis	Chemical	
46-0-0	Urea	Solution
34-0-0-0	Ammonium nitrate	Solution
34-0-0-11	Ammonium sulfate and urea	Granular
21-0-0-24	Ammonium sulfate	Granular
82-0-0	Anhydrous ammonia	Gaseous
*28-0-0	Ammonium nitrate and urea	Prilled
*11-48-0	Monoammonium phosphate	Granular
18-46-0	Diammonium phosphate	Granular
*23-23-0	Urea and ammonium phosphate	Granular
	Ammonium nitrate and ammonium phosphate	Granular
*27-14-0	Urea and ammonium phosphate	Granular
	Ammonium nitrate and ammonium phosphate	Granular
16-20-0-14	Ammonium nitrate and ammonium sulfate	Granular
0-45-0	Triple superphosphate	Granular
0-0-60	Potassium chloride	Granular
*0-0-50-17.6	Potassium sulfate	Granular
*21-0-0	Aqua ammonia	Solution
15-0-0	Calcium nitrate	Granular
0-0-0-16	Calcium sulfate	Granular
*0-0-0-95	Elemental sulfur	Powdered

*The actual nutrient content may vary depending on the manufacturer.

APPENDIX C

<u>SOIL ANALYTICAL METHOD CODES</u>

<u>For card type 08 in File 4.</u> These codes specify what is being analyzed and
the significant features of the analysis.

A codes represent all the detail specified.
<u>B codes are used to signify that additional details are specified in
special notes.</u>

Nitrogen

    Total Nitrogen

        A001 Semimicro, $NO_2 + NO_3$ included   B001
        A002 Semimicro, $NO_2 + NO_3$ not included   B002
        A003 Macro-Kjeldahl, $NO_2 + NO_3$ included   B003
        A004 Macro-Kjeldahl, $NO_2 + NO_3$ not included   B004
        A005 Micro-Kjeldahl   B005
        A006 Nitrogen analyzer   B006

    Nitrate Nitrogen

        A007 Steam distillation (MgO)   B007
        A008 Incubated   B008
        A009 **Extractable by $CuSO_4 \cdot Ag_2SO_4$ (by volume)**   B009
        A010 NO_3 electrode   B010
        A011 Cadmium reduction   B011
        A012 Phenoldisulfonic acid by volume   B012
        A013 Phenoldisulfonic acid by weight   B013
        A014 Extracted by 0.5 N $NaHCO_3$ B014
        A015 Extractable by $CuSO_4 \cdot Ag_2SO_4$ (by weight)   B015
        A702 Extractable by $CuSO_4 \cdot Ag_2SO_4$ B702
        A706 PDS acid colorimetry   B706

    Ammonium Nitrogen

        A016 Steam distillation (MgO)   B016

Phosphorus

    Total Phosphorus

        A023 Digestion with $HClO_4$ B023
        A024 Fusion with Na_2CO_3 B024

    Organic Phosphorus

        A025 Ignition   B025
        A026 Extraction with H_2SO_4 B026
        A027 Extraction with $HCl_2H_2SO_4$ B027

    Inorganic Phosphorus

        A028 Soluble in dilute acid fluoride (weight basis) B028
        A029 Soluble in $NaHCO_3$ (Olsen)   B029
        A030 Soluble in dilute $HCl_2H_2SO_4$ B030

A031 Soluble in H_2O B031
A032 Isotopic dilution of ^{32}P B032
A033 Soluble in dilute acid fluoride (volume basis)   B033

Available Potassium

A040 Extraction with NH_4OAc, pH 7   B040
A041 Extracted in $NaHCO_3$ B041

Exchangeable Potassium (buffered to pH other than neutrality)

A042 EDTA titration   B042
A043 Phosphate titration   B043
A044 EtOH titration   B044
A045 Gravimetric   B045
A046 Flame photometry   B046
A047 Atomic absorption   B047
A048 Auto-analyzer   B048

Exchangeable Potassium (Neutral salt)

A056 EDTA titration   B056
A057 Phosphate titration   B057
A058 EtOH titration   B058
A059 Aluminon titration   B059
A060 Flame photometry   B060
A061 Atomic absorption   B061
A062 Auto-analyzer   B062

Exchangeable Potassium (neutral NH_4OAc, pH 7)

A613 EDTA titration   B613
A614 Phosphate titration   B614
A615 EtOH titration   B615
A616 Gravimetric   B616
A617 Flame photometry   B617
A618 Atomic absorption   B618
A619 Auto-analyzer   B619

Potassium (water-extractable)

A049 EDTA titration   B049
A050 Phosphate titration   B050
A051 EtOH titration   B051
A052 Gravimetric   B052
A053 Flame photometry   B053
A054 Atomic absorption   B054
A055 Auto-analyzer   B055

Sulfur (available)

A063 Acetate soluble   B063
A064 Bicarbonate soluble   B064
A065 Extracted in $NaHCO_3$ B065
A066 Extracted in $AlCl_3$ B066

Sulfate Sulfur (water-extractable)

A067 SO_4-gravimetric $BaSO_4$ B067

Calcium (exchangeable neutral salt)

A075 EDTA titration	B075
A076 Phosphate titration	B076
A077 EtOH titration	B077
A078 Aluminon titration	B078
A079 Flame photometry	B079
A080 Atomic absorption	A080
A081 Auto-analyzer	A081

Calcium (exchangeable buffered to pH other than neutrality)

A082 EDTA titration	B082
A083 Phosphate titration	A083
A084 EtOH titration	B084
A085 Gravimetric	B085
A086 Flame photometry	B086
A087 Atomic absorption	B087
A088 Auto-analyzer	B088

Calcium (exchangeable neutral NH_4OAc, pH 7)

A620 EDTA titration	B620
A621 Phosphate titration	B621
A622 EtOH titration	B622
A623 Gravimetric	B623
A624 Flame photometry	B624
A625 Atomic absorption	B625
A626 Auto-analyzer	B626

Calcium (water-extractable)

A089 EDTA titration	B089
A090 Phosphate titration	B090
A091 EtOH titration	B091
A092 Gravimetric	B092
A093 Flame photometry	B093
A094 Atomic absorption	B094
A095 Auto-analyzer	B095

Magnesium (exchangeable neutral NH_4OAc, pH 7)

A096 EDTA titration	B096
A097 Phosphate titration	B097
A098 EtOH titration	B098
A099 Gravimetric	B099
A100 Flame photometry	B100
A101 Atomic absorption	B101
A102 Auto-analyzer	B102

Magnesium (exchangeable neutral salt)

A103 EDTA titration	B103
A104 Phosphate titration	B104
A105 EtOH titration	B105
A106 Aluminon titration	B106
A107 Flame photometry	B107
A108 Atomic absorption	B108
A109 Auto-analyzer	B109

Magnesium (exchangeable buffered to pH other than neutrality)

      A110 EDTA titration   B110
      A111 Phosphate titration   B111
      A112 EtOH titration   B112
      A113 Gravimetric   B113
      A114 Flame photometry   B114
      A115 Atomic absorption   B115
      A116 Auto-analyzer   B116

Magnesium (water-extractable)

      A117 EDTA titration   B117
      A118 Phosphate titration   B118
      A119 EtOH titration   B119
      A120 Aluminon titration   B120
      A121 Flame photometry   B121
      A122 Atomic absorption   B122
      A123 Auto-analyzer   B123
      A703 Gravimetric

Aluminum (exchangeable neutral salt)

      A131 EDTA titration   B131
      A132 Phosphate titration   B132
      A133 EtOH titration   B133
      A134 Aluminon titration   B134
      A135 Flame photometry   B135
      A136 Atomic absorption   B136
      A137 Auto-analyzer   B137

Aluminum (elemental analysis), Various Extracts

      A138 Acid (HNO_3, $HClO_4$, HF)   B138
      A139 Lithium metaborate   B139
      A140 Sodium carbonate   B140
      A141 Dithionite-citrate-bicarbonate   B141
      A142 Extractable in 0.02 M $CaCl_2$ B142
      A143 DTPA-TEA extract   B143
      A144 EDTA extract   B144
      A145 0.1 N HCl extract   B145
      A146 Acid ammonium oxalate   B146
      A147 Sodium pyrophosphate   B147

Sodium (exchangeable neutral NH_4OAc, pH 7)

     A148 EDTA titration   B148
     A149 Phosphate titration   B149
     A150 EtOH titration   B150
     A151 Gravimetric   B151
     A152 Flame photometry   B152
     A153 Atomic absorption   B153
     A154 Auto-analyzer   B154

Sodium (exchangeable buffered to pH other than neutrality)

     A155 EDTA titration   B155
     A156 Phosphate titration   B156
     A157 EtOH titration   B157
     A158 Gravimetric   B158
     A159 Flame photometry   B159
     A160 Atomic absorption   B160
     A161 Auto-analyzer   B161

Sodium (extractable water)

     A162 EDTA titration   B162
     A163 Phosphate titration   B163
     A164 EtOH titration   B164
     A165 Gravimetric   B165
     A166 Flame photometry   B166
     A167 Atomic absorption   B167
     A168 Auto-analyzer   B168

Carbonate (water extract)

     A176 Acid titration   B176

Bicarbonate (water extract)

     A177 Acid titration   B177

Chloride (water extract)

     A185 Mohr titration   B185
     A186 Potentiometric titration   B186
     A187 Cl electrode   B187

Copper

     A194 Perchloric acid   B194
     A195 EDTA-HCl extractable   B195
     A196 Acid HNO_3, $HClO_4$, HF   B196
     A197 Lithium metaborate   B197
     A198 Sodium carbonate   B198

Zinc

A205 Perchloric acid	B205
A206 EDTA-HCl extractable	B206
A207 Acid HNO_3, $HClO_4$, HF	B207
A208 Lithium metaborate	B208
A209 Sodium carbonate	B209

Iron

A210 Perchloric acid	B210
A211 EDTA-HCl extractable	B211
A212 Acid HNO_3, $HClO_4$, HF	B212
A213 Lithium metaborate	B213
A214 Sodium carbonate	B214
A215 Dithionite-citrate-bicarbonate	B215
A216 Acid ammonium oxalate	B216
A217 Sodium pyrophosphate	B217
A218 Acid ammonium acetate	B218
A219 Neutral ammonium acetate	B219
A220 Dithionite-citrate extraction	B220
A221 DTPA-TEA extractable elements	B221
A222 Orthophenanthrolic extraction	B222

Manganese

A225 Perchloric acid	B225
A226 EDTA-HCl extractable	B226
A227 Acid HNO_3, $HClO_4$, HF	B227
A228 Lithium metaborate	B228
A229 Sodium carbonate	B229
A230 Dithionite-citrate-bicarbonate	B230
A231 Acid ammonium oxalate	B231
A232 Sodium pyrophosphate	B232
A233 Acid ammonium acetate	B233
A234 Extractable in 0.02 M $CaCl_2$	B234
A235 DTPA-TEA extractable elements	B235
A236 EDTA extractable elements	B236
A237 0.1 N HCl extractable	B237

Boron

A240 Perchloric acid	B240
A241 Acid HNO_3, $HClO_4$, HF	B241
A242 Sodium carbonate	B242
A243 Hot H_2O soluble azomethine-H	B243
A244 Hot H_2O soluble currunin	B244
A245 Hot H_2O soluble dianthrimide	B245
A246 DTPA-TEA extractable elements	B246
A247 EDTA extractable elements	B247
A248 0.1 N HCl extractable elements	B248

Selenium

A251 Acid HNO_3, $HClO_4$	B251
A252 Acid HNO_3, H_2SO_4	B252
A253 Acid HNO_3, $HClO_4$, HF	B253
A254 Lithium metaborate	B254
A255 Sodium carbonate	B255

A256 DTPA-TEA   B256
A257 EDTA   B257
A258 0.1 N HCl   B258

Molybdenum

A263 Perchloric acid   B263
A264 Acid HNO_3, $HClO_4$, HF   B264
A265 Lithium metaborate   B265
A266 Sodium carbonate   B266
A267 DTPA-TEA   B267
A268 EDTA   B268
A269 0.1 N HCl   B269

Lead

A274 Perchloric acid   B274
A275 EDTA-HCl extractable   B275
A276 Acid HNO_3, $HClO_4$, HF   B276
A277 Lithium metaborate   B277
A278 Sodium carbonate   B278

Cobalt

A286 Perchloric acid   B286
A287 EDTA-HCl extractable   B287
A288 Acid HNO_3, $HClO_4$, HF   B288
A289 Lithium metaborate   B289
A290 Sodium carbonate   B290

Mercury

A298 Acid HNO_3-H_2SO_4 B298

Arsenic

A306 Vapor generator   B306
A307 Acid HCl-H_2SO_4 B307

Beryllium

A315 Lithium metaborate   B315
A316 Sodium carbonate   B316

Cadmium

A324 Perchloric acid   B324
A325 EDTA extractable   B325
A326 Acid HNO_3, $HClO_4$, HF   B326
A327 Lithium metaborate   B327
A328 Sodium carbonate   B328

Chromium

A336	Perchloric acid	B336
A337	EDTA extractable	B337
A338	Acid HNO_3, $HClO_4$, HF	B338
A339	Lithium metaborate	B339
A340	Sodium carbonate	B340

Strontium

A348	Perchloric acid	B348
A349	Acid HNO_3, $HClO_4$, HF	B349
A350	Lithium metaborate	B350
A351	Sodium carbonate	A351

Vanadium

A360	Perchloric acid	B360
A361	Acid HNO_3, $HClO_4$, HF	B361
A362	Lithium metaborate	B362
A363	Sodium carbonate	B363

Nickel

A371	Perchloric acid	B371
A372	EDTA extractable	B372
A373	Acid HNO_3, $HClO_4$, HF	B373
A374	Lithium metaborate	B374
A375	Sodium carbonate	B375

Fluorine

A383	Hot H_2SO_4 and steam distillate	B383
A384	Calcium oxide and steam distillate	B384
A385	Lithium metaborate	B385
A386	Boron (III) oxide	B386

pH

A394	Water 1:1 supernatant	B394
A395	Water 1:1 suspension	B395
A396	Water 1:5 supernatant	B396
A397	Water 1:5 suspension	B397
A398	Water-saturated paste	B398
A399	Water-saturated extract	B399
A400	Calcium chloride supernatant	B400
A401	Calcium chloride suspension	B401
A402	Potassium chloride supernatant	B402
A403	Potassium chloride suspension	B403
A404	Sodium fluoride supernatant	B404
A405	Sodium fluoride suspension	B405
A406	Water 1:1 paste	B406
A407	Calcium chloride paste	B407

Organic Carbon

    A413 Dry combustion, induction furnace   B413
    A414 Wet oxidation (Allison)   B414
    A415 Wet oxidation (Walkley-Black)   B415
    A416 Dry combustion, resistance furnace   B416

Organic Matter

    A424 Dry combustion, induction furnace   B424
    A425 Wet oxidation (Allison)   B425
    A426 Wet oxidation (Walkley-Black)   B426
    A427 Dry combustion, resistance furnace   B427
    A428 Pyrophosphate soluble   B428

Calcium Carbonate Equivalent

    A436 Gas volumetric   B436
    A437 Gravimetric approximate quantitative   B437
    A438 Pressure.   B438
    A439 Citrate buffer   B439
    A440 Titrimetric   B440

Electrical Conductivity implied units mmhos cm^{-1}

    A449 Saturated, mixed   B449
    A450 Saturated, capillary rise   B450
    A451 1:5 soil:water   B451
    A453 1:1 soil:water   B453

Percent H_2O at which electrical conductivity is measured

    A452 Gravimetric   B452

Cation Exchange Capacity

    Permanent charge
        A460 Neutral salt, long method   B460
        A461 Neutral salt, rapid method   B461
    Buffered
        A462 NH_4OAc, pH 7.0   B462
        A463 NH_4OAc, pH 8.2   B463
        A464 $BaCl_2$, pH 8.0   B464
        A465 $Ca(OAc)_2$-$CaCl_2$, pH 7.0   B465
        A466 $Ca(OAc)_2$, pH 5.0   B466
        A467 NaOAc, pH 8.2   B467

Soil Moisture %

    1/10 Atmosphere tension

        A475 Disturbed sample   B475
        A476 Undisturbed sample   B476
        A477 Field measurement   B477

1/3 Atmosphere tension

    A478 Disturbed sample   B478
    A479 Undisturbed sample   B479
    A480 Field measurement   B480

15 Atmosphere tension

    A481 Disturbed sample   B481
    A482 Undisturbed sample   B482
    A483 Field measurement   B483

Hygroscopic Moisture

    A484 Disturbed sample   B484
    A485 Undisturbed sample   B485
    A486 Field measurement   B486

Particle Size Analysis

Total sand >50 μm

    A494 Pipette   B494
    A495 Hydrometer   B495
    A496 Plummet   B496
    A497 Decanting   B497
    A498 Ultrasonic sieving   B498
    A499 X-ray   B499
    A500 Wet sieving   B500

Total silt 50-2 μm

    A501 Pipette   B501
    A502 Hydrometer   B502
    A503 Plummet   B503
    A504 Decanting   B504
    A505 Ultrasonic sieving   B505
    A506 X-ray   B506
    A507 Wet sieving   B507

Total clay <2 μm

    A508 Pipette   B508
    A509 Hydrometer   B509
    A510 Plummet   B510
    A511 Decanting   B511
    A512 Ultrasonic sieving   B512
    A513 X-ray   B513
    A514 Wet sieving   B514

Bulk Density

    A522 Field state   B522
    A523 Air-dry   B523
    A524 Oven-dry   B524
    A525 30 cm absorption   B525
    A526 1/3 bar desorption   B526

Specific Gravity

      A534 Pycnometer   B534

Atterberg Limits

      A542 Plastic limit   B542
      A543 Liquid limit   B543
      A544 Shrinkage limit   B544

Specific Surface Area by Sorption

      A552 Ethylene glycol   B552
      A553 Glycerol   B553
      A554 Gases   B554
      A555 Water   B555
      A556 Orthophenanthroline   B556

Aggregate Stability

      A564 Wet sieving   B564
      A565 Dry sieving   B565
      A566 Rainfall simulation   B566

Infiltration Rate

      A574 Rainfall simulation   B574
      A575 Flooding   B575
      A576 Watershed hydrograph   B576
      A577 Portable infiltrometer   B577
      A578 Auger hole   B578

Hydraulic Conductivity

      A586 Constant head   B586
      A587 Falling head   B587
      A588 Auger hole   B588
      A589 Piezometer   B589
      A590 Double tube   B590
      A591 Shallow-well pump-in   B591
      A592 Permeameter   B592
      A593 Steady-state   B593
      A594 Air entry permeameter   B594

Porosity

      A602 Bulk density determinations   B602
      A603 Air-space pycnometer   B603
      A604 Tension table   B604

Textural Designation

      A611 Textural triangle   B611
      A612 Estimated   B612
            0100 coarse sand
            0200 sand
            0300 fine sand
            0400 very fine sand
            0500 loamy coarse sand
            0600 loamy sand
            0700 loamy fine sand
            0800 loamy very fine sand
            0900 coarse sandy loam
            1000 sandy loam
            1100 fine sandy loam
            1200 very fine sandy loam
            1300 loam
            1400 silt loam
            1500 silt
            1600 sandy clay loam
            1700 fine sandy clay loam
            1800 very fine sandy clay loam
            1900 clay loam
            2000 silty clay loam
            2100 sandy clay
            2200 silty clay
            2300 clay
            2400 heavy clay
            2500 organic

Oxygen Diffusion Rate

      A707 Platinum electrode   B707

APPENDIX D

DATA FIELD* NAMES USED FOR DATA RETRIEVAL

FIELD NAME

FILE 1   SITE DATA

1   <u>HEADER</u>
     1A   FILE NUMBER
     1B   PROVINCE
     1C   YEAR
     1D   PROJECT IDENTIFICATION NUMBER
     1E   AGENCY NUMBER
     1F   SUPERVISOR'S INITIALS

2   <u>IDENTIFICATION SEGMENT</u>
     2A   PROJECT INITIATION
     2B   PROJECT CESSATION
     2C   PURPOSE OF EXPERIMENT
          2C1 PURPOSE
          2C2 TYPE
          2C3 NAME OF PROJECT (FREE FORMAT)

3   <u>IDENTIFICATION SEGMENT</u> (continued)
     INCLUDED SEGMENTS AND CREDIBILITY
     3A   IDENTIFICATION
     3B   LOCATION
     3C   SITE DESCRIPTION
     3D   SOIL CLASSIFICATION
     3E   SOIL MORPHOLOGY
     3F   HISTORICAL PLOT MANAGEMENT
     3G   CURRENT-YEAR PLOT MANAGEMENT
     3H   SPECIAL NOTES
     3I   INTERPRETATIVE COMMENTS
     3J   WEATHER
     3S   SOIL TEMPERATURE AND SOIL MOISTURE
     3T   PHYSICAL DATA
     3U   CHEMICAL DATA (GENERAL)
     3V   CHEMICAL DATA (SALINITY)
     3W   CHEMICAL DATA (MACRONUTRIENTS)
     3X   CHEMICAL DATA (MICRONUTRIENTS)
     3ZF GROWTH STAGES
     3ZG PHENOLOGY SEGMENT
     3ZH GROWTH (FREE FORMAT)
     3ZI DAMAGE
     3ZJ YIELD AND QUALITY
     3ZK ELEMENTAL ANALYSIS
     3ZL OILSEED ANALYSIS
     3ZM FEED ANALYSIS
     3ZN ENZYME ACTIVITY
     3ZØ LEVEL DEFINITION
     3ZP FACTOR DEFINITION
     3ZQ FACTOR LEVEL NESTING

*A data field represents a specific unit of data. The alphanumeric
 field names are codes that identify data units of any size.

4   LOCATION SEGMENT
    4A   LEGAL LOCATION
         4A1   MUNICIPALITY, COUNTY, OR DISTRICT
         4A2   QUARTER-SECTION
         4A3   SECTION NUMBER
         4A4   TOWNSHIP
         4A5   TOWNSHIP MODIFIER
         4A6   RANGE OR CONCESSION
         4A7   HEADING
         4A8   MERIDIAN
    4B   NTS MAP AREA
         4B1   PRIMARY QUADRANT
         4B2   ALPHA DIVISION
         4B3   NUMERIC DIVISION
         4B4   DIRECTION
    4C   PLOT CENTER - POINT LOCATION
         4C11 LATITUDE
             4C111 DEGREES
             4C112 MINUTES
             4C113 SECONDS
         4C12 LONGITUDE
             4C121 DEGREES
             4C122 MINUTES
             4C123 SECONDS
         4C2   MILITARY GRID REFERENCE
             4C21 ZONE
             4C22 ALPHA LETTER
             4C23 100 000 METRE
             4C24 EASTING
             4C25 NORTHING
    4D   LEGAL SUBDIVISIONS

5   SITE DESCRIPTION SEGMENT
    5A   SLOPE
         5A1   PERCENT SLOPE
         5A2   SLOPE TYPE
         5A3   CLASS
         5A4   ASPECT
         5A5   SAMPLE SITE POSITION ON SLOPE
         5A6   SLOPE LENGTH
    5B   SOIL MOISTURE AND DRAINAGE
         5B1   MOISTURE REGIME SUBCLASS
         5B2   SOIL SITE DRAINAGE CLASSES
         5B3   SOIL PERVIOUSNESS CLASSES
    5C   SURFACE RUNOFF
    5D   SEEPAGE
    5E   EROSION
         5E1   GENERAL WATER EROSION
         5E2   GULLY EROSION
         5E3   WIND
    5F   STONINESS
    5G   ROCKINESS
    5H   DEPTH TO BEDROCK
    5I   DEPTH TO PERMAFROST
    5J   DEPTH TO APPARENT WATER TABLE
    5K   DEPTH TO LIME

```
7      SOIL MORPHOLOGY SEGMENT
       7A    LAYER/HORIZON DESIGNATION
             7A1   LITHOLOGIC DISCONTINUITY
             7A2   MASTER LAYER/HORIZON
             7A3   SUFFIXES
             7A4   MODIFIER
       7B    LAYER/HORIZON DEPTH AND THICKNESS
             7B1   MODAL (cm)
                   7B11 UPPER LIMIT
                   7B12 LOWER LIMIT
             7B2   RANGE (cm)
                   7B21 MIN
                   7B22 MAX
       7C    COLOR
             7C1   ASPECT
             7C2   HUE
                   7C21 NUMERAL
                   7C22 SYMBOL
             7C3   VALUE
             7C4   CHROMA
       7D    TEXTURE
             7D1   CLASS
             7D2   TEXTURE MODIFIERS
       7E    SOIL STRUCTURE
             7E1   GRADE
             7E2   CLASS SIZE
             7E3   KIND
             7E4   KIND MODIFIER
       7F    CONSISTENCE
             7F1   WET
             7F2   MOIST
             7F3   DRY
             7F4   PLASTICITY
       7G    EFFERVESCENCE
             7G1   REAGENT
             7G2   DEGREE OF EFFERVESCENCE

8      HISTORICAL PLOT MANAGEMENT SEGMENT
       8A    PAST MANAGEMENT ON PLOT (LAND USE)
             8A1   URBAN
             8A2   AGRICULTURE
             8A3   ROUGH GRAZING AND RANGELAND
             8A4   WOODLAND
             8A5   WETLAND
             8A6   OTHER
       8B    AGRICULTURAL LAND USE, CROPPING HISTORY, CROPS GROWN
             8B1   CEREALS AND RELATED CROPS
             8B2   OTHER FIELD CROPS
             8B3   FORAGE AND SEED CROPS
             8B4   FALLOW
             8B5   MARKET VEGETABLE CROPS
             8B6   MARKET FRUIT CROPS
             8B7   SPECIALTIES
             8B8   AVERAGE LENGTH OF ROTATION
             8B9   NUMBER OF YEARS UNDER CULTIVATION
```

```
        10G  WEED CONTROL METHODS
        10H  SPECIAL SOIL MANAGEMENT PRACTICES
        10I1 SPECIAL SOIL AMENDMENTS USED
        10I2 RATE OF AMENDMENTS APPLIED (kg/ha)
        10J  SPECIAL SOIL PROBLEMS

11   SPECIAL NOTES (FREE FORMAT)

12   INTERPRETATIVE COMMENTS

13   WEATHER SEGMENT
        13B  DATE
             13B1 DAY
             13B2 MONTH
        13C  AIR TEMPERATURE
             13C1 ±MINIMUM
             13C2 ±MAXIMUM
        13D  SOIL TEMPERATURE
             13D1 DEPTH (cm)
                  13D11 UPPER LIMIT
                  13D12 LOWER LIMIT
             13D2 ±TEMPERATURE
        13E  SOIL MOISTURE
             13E1 DEPTH (cm)
                  13E11 UPPER LIMIT
                  13E12 LOWER LIMIT
             13E2 PERCENTAGE
        13F  PRECIPITATION EVENTS IN GROWING SEASON
             13F1 DURATION (h)
             13F2 RAINFALL (mm)
        13G  EVAPORATION
        13H  POTENTIAL EVAPOTRANSPIRATION
        13I  ±MOISTURE DEFICIT
        13J  PERIOD OF OBSERVATION
             13J1 FROM
                  13J11 DAY
                  13J12 MONTH
             13J2 TO
                  13J21 DAY
                  13J22 MONTH


14   METHODS SEGMENT
        14A1 AIR TEMPERATURE UNITS
        14A2 SOIL TEMPERATURE UNITS
        14A3 SOIL MOISTURE METHOD
        14B  EVAPORATION
             14B1 UNITS
             14B2 METHOD
             14B3 CONVERSION FACTOR TO CDA PAN
        14C  POTENTIAL EVAPOTRANSPIRATION UNITS
        14D  MOISTURE DEFICIT
        14E  TOTAL PRECIPITATION DURING GROWING SEASON (cm)
             14F11 AGROCLIMATIC AREA
             14F12 CLIMATE REFERENCE STATION
```

FILE 7

1   HEADER
     1A   FILE NUMBER
     1B   PROVINCE
     1C   YEAR
     1D   PROJECT IDENTIFICATION NUMBER
     1E   AGENCY NUMBER
     1F   SUPERVISOR'S INITIALS
     1G   FACTOR NUMBER
     1H   LEVEL NUMBER
     1I   ASSOCIATION

2   LEVEL DESCRIPTION SEGMENT
     2A1 INFORMATION TYPE
     2A2 SOURCE CODE
     2A3 METHOD OF APPLICATION
     2A4 PLACEMENT INCORPORATION
     2B   CHEMICAL SYMBOL, FORMULA, OR CROP CODE
     2C   TREATMENT CODE (METHODS)
     2D   PERCENTAGE COMPOSITION
     2E   RATE OF APPLICATION
     2F   UNITS
     2G   BASIS
     2H   DATE
           2H1 TIME (h)
           2H2 DAY
           2H3 MONTH
     2I   CODE
     2J   FORM OF MATERIAL
     2K   MIXTURE OR ASSOCIATION
     2I   YEAR

3   FACTOR DEFINITION SEGMENT*
   *3A1 FACTOR NUMBER 01
        3A11 FACTOR CODE
        3A12 NUMBER OF LEVELS
        3A13 ADDITIONAL PROPERTIES OF THIS AMENDMENT ARE DEFINED IN FACTOR
        3A14 FREE-FORMAT OBSERVATIONS
        3A11 LEVEL CODE
   *3A2 FACTOR NUMBER 02
        3A21 FACTOR CODE
        3A22 NUMBER OF LEVELS
        3A23 ADDITIONAL PROPERTIES OF THIS AMENDMENT ARE DEFINED IN FACTOR
        3A24 FREE-FORMAT OBSERVATIONS
        3A21 LEVEL CODE
   *3A3 FACTOR NUMBER 03
        3A31 FACTOR CODE
        3A32 NUMBER OF LEVELS
        3A33 ADDITIONAL PROPERTIES OF THIS AMENDMENT ARE DEFINED IN FACTOR
        3A34 FREE-FORMAT OBSERVATIONS
        3A31 LEVEL CODE

*For information on factors, retrieval must specify card number 41; for
 information on levels, retrieval must specify card number 1-40.

```
    *3A4    FACTOR NUMBER 04
            3A41 FACTOR CODE
            3A42 NUMBER OF LEVELS
            3A43 ADDITIONAL PROPERTIES OF THIS AMENDMENT ARE DEFINED IN FACTOR
            3A44 FREE-FORMAT OBSERVATIONS
            3A41 LEVEL CODE
    *3A5    FACTOR NUMBER 05
            3A51 FACTOR CODE
            3A52 NUMBER OF LEVELS
            3A53 ADDITIONAL PROPERTIES OF THIS AMENDMENT ARE DEFINED IN FACTOR
            3A54 FREE-FORMAT OBSERVATIONS
            3A51 LEVEL CODE
    *3A6    FACTOR NUMBER 06
            3A61 FACTOR CODE
            3A62 NUMBER OF LEVELS
            3A63 ADDITIONAL PROPERTIES OF THIS AMENDMENT ARE DEFINED IN FACTOR
            3A64 FREE-FORMAT OBSERVATIONS
            3A61 LEVEL CODE


4     NESTING ORDER
      4A    LEVELS OF FACTOR 1
      4B    LEVELS OF FACTOR 2
      4C    LEVELS OF FACTOR 3
      4D    LEVELS OF FACTOR 4
      4E    LEVELS OF FACTOR 5
      4F    LEVELS OF FACTOR 6


FILE 3

SOIL TEMPERATURE AND SOIL MOISTURE DATA

1     HEADER
      1A    FILE NUMBER
      1B    PROVINCE
      1C    YEAR
      1D    PROJECT IDENTIFICATION NUMBER
      1E    AGENCY NUMBER
      1F    SUPERVISOR'S  INITIALS
      1G    CODED TREATMENT NUMBER
      1H    REPLICATE
            1I    DATE
                  1I1 DAY
                  1I2 MONTH
            1J    DEPTH (cm)
                  1J1 UPPER LIMIT
                  1J2 LOWER LIMIT
2     SOIL TEMPERATURE AND SOIL MOISTURE SEGMENT
      2A    ±SOIL TEMPERATURE
      2B    SOIL MOISTURE
14    METHODS SEGMENT
      14J1 SOIL TEMPERATURE UNITS
      14J2 SOIL MOISTURE METHOD
```

FILE 4

```
1     HEADER
      1A    FILE NUMBER
      1B    PROVINCE
      1C    YEAR
      1D    PROJECT IDENTIFICATION NUMBER
      1E    AGENCY NUMBER
      1F    SUPERVISOR'S INITIALS
      1G    CODED TREATMENT NUMBER
      1H    REPLICATE
      1I    DATE
            1I1   DAY
            1I2   MONTH
      1J    DEPTH (cm)
            1J1   UPPER LIMIT
            1J2   LOWER LIMIT
2     SOIL-PHYSICAL DATA SEGMENT
      2A    SOIL MOISTURE RETENTION PERCENTAGE
            2A1   1/10 ATMOSPHERE
            2A2   1/3 ATMOSPHERE
            2A3   15 ATMOSPHERES
            2A4   HYGROSCOPIC MOISTURE
      2B    PARTICLE SIZE ANALYSIS
            2B1   PERCENTAGE
                  2B11 3 IN. SIEVE
                  2B12 3/4 IN.  SIEVE
                  2B13 No. 4 SIEVE
                  2B14 No. 10 SIEVE
            2B2   PERCENTAGE OF SAMPLE (<2 mm)
                  2B21 VERY COARSE SAND
                  2B22 COARSE SAND
                  2B23 MEDIUM SAND
                  2B24 FINE SAND
                  2B25 VERY FINE SAND
                  2B26 TOTAL SAND
                  2B27 TOTAL SILT 50-2 $\mu$m
                        2B281 TOTAL CLAY <2 $\mu$m
                        2B282 FINE CLAY <0.2 $\mu$m
      2C    BULK DENSITY g/cm$^3$

14K   METHODS SEGMENT                    FILE 1
      14K1 SOIL MOISTURE RETENTION
            14K11 SAMPLE PREPARATION
            14K12 SAMPLE STATE
            14K13 METHOD
      14K2 PARTICLE SIZE ANALYSIS
            14K21 REMOVAL OF:
            14K22 DISPERSION
            14K23 METHOD
      14K3 BULK DENSITY
            14K31 SAMPLE STATE
            14K32 METHOD
            14K33 ORGANIC SOILS
```

3   SOIL CHEMICAL DATA SEGMENT (GENERAL)
       3A   ORGANIC CARBON PERCENTAGE
       3B   CALCIUM CARBONATE EQUIVALENT PERCENTAGE
       3C   TOTAL NITROGEN PERCENTAGE
       3D   CATION EXCHANGE
             3D1   BUFFERED
             3D2   PERMANENT
       3E   EXCHANGEABLE CATIONS meq/100 g
             3E1   NEUTRAL SALT
                   3E11 Ca
                   3E12 Mg
                   3E13 Al
             3E2   BUFFERED
                   3E21 Ca
                   3E22 Mg
                   3E23 Na
                   3E24 K
       3F   pH

14L   METHODS SEGMENT   FILE 1
       14L1 ORGANIC CARBON
       14L2 CALCIUM CARBONATE EQUIVALENT
       14L3 TOTAL NITROGEN
       14L4 CATION EXCHANGE CAPACITY
             14L41 PERMANENT CHARGE
             14L42 BUFFERED
       14L5 EXCHANGEABLE CATIONS
             14L51 NEUTRAL SALT
             14L52 BUFFERED METHOD
             14L53 ANALYTICAL PROCEDURE
             14L54 ANALYTICAL PROCEDURE
       14L6 pH
             14L61 SAMPLE STATE
             14L62 METHOD
             14L63 MEASUREMENT

4   SOIL CHEMICAL DATA SEGMENT (SALINITY)
       4A   ELECTRICAL CONDUCTIVITY mmhos/cm at 25°C
       4B   PERCENTAGE WATER AT SATURATION
       4C   WATER EXTRACT DETERMINATIONS mg/g
             4C1   Ca   4C5 CO_3
             4C2   Mg   4C6 HCO_3
             4C3   Na   4C7   Cl
             4C4   K   4C8 SO_4
                              4C9 NO_3

14M   METHODS SEGMENT
       14M1 ELECTRICAL CONDUCTIVITY AND WATER EXTRACT DETERMINATIONS
             EXTRACT DETERMINATIONS
             EXTRACT SOURCE
       14M2 WATER EXTRACT DETERMINATIONS
             EXTRACT DETERMINATIONS
             14M21 Ca
             14M22 Mg
             14M23 Na

```
                14M24 K
                14M25 CO₃
                14M26 HCO₃
                14M27 Cl
                14M28 SO₄
                14M29 NO₃
```

5   SOIL CHEMICAL DATA SEGMENT (MACRONUTRIENTS)
       5A   NITROGEN
             5A1   NITRATE
                   5A11 VALUE 1
                   5A12 VALUE 2
       5B   EXTRACTABLE PHOSPHORUS
             5B1   VALUE 1
             5B2   VALUE 2
             5B3   VALUE 3
       5C   EXTRACTABLE POTASSIUM
             5C1   VALUE 1
             5C2   VALUE 2
       5D   EXTRACTABLE SULFUR
             5D1   VALUE 1
             5D2   VALUE 2

14N   METHODS SEGMENT
       14N1 NITRATE-N
             14N11 METHOD 1
             14N12 METHOD 2
       14N2 AMMONIUM-N METHOD
       14N3 EXTRACTABLE P
             14N31 METHOD 1
             14N32 METHOD 2
             14N33 METHOD 3
       14N4 EXTRACTABLE K
             14N41 METHOD 1
             14N42 METHOD 2
       14N5 EXTRACTABLE S
             14N51 METHOD 1
             14N52 METHOD 2

6   SOIL CHEMICAL DATA SEGMENT (MICRONUTRIENTS)
       6A   EXTRACTABLE Cu
             6A1   VALUE 1
             6A2   VALUE 2
       6B   EXTRACTABLE Zn
             6B1   VALUE 1
             6B2   VALUE 2
       6C   EXTRACTABLE Fe
             6C1   VALUE 1
             6C2   VALUE 2
       6D   EXTRACTABLE Al
             6D1   VALUE 1
             6D2   VALUE 2
       6E   EXTRACTABLE Mn
             6E1   VALUE 1
             6E2   VALUE 2

```
        6F    EXTRACTABLE B
              6F1   VALUE 1
              6F2   VALUE 2
        6G    EXTRACTABLE Se
              6G1   VALUE 1
              6G2   VALUE 2
        6H    EXTRACTABLE Mo
              6H1   VALUE 1
              6H2   VALUE 2


7       SOIL TEST RECOMMENDATIONS
        7A    ORGANIC MATTER PERCENTAGE
        7B    SOIL TEST LAB NUMBER
        7C    RECOMMENDED FERTILIZER APPLICATIONS
              7C1   N
              7C2   P-$P_2O_5$
              7C3   K-$K_2O$
              7C4   Lime


14P     UNITS FOR RECOMMENDED FERTILIZER APPLICATIONS
        14P1  $N_2$, $P_2O_5$ and $K_2O$
        14P2  Lime


8       ADDITIONAL SOIL METHODS
        8A    METHOD AND ANALYSIS TYPE
              8A1   ANALYSIS 1
              8A2   ANALYSIS 2
              8A3   ANALYSIS 3
              8A4   ANALYSIS 4
        8B    CONCENTRATION VALUE
              8B1   ANALYSIS 1
              8B2   ANALYSIS 2
              8B3   ANALYSIS 3
              8B4   ANALYSIS 4
        8C    UNITS
              8C1   ANALYSIS 1
              8C2   ANALYSIS 2
              8C3   ANALYSIS 3
              8C4   ANALYSIS 4


FILE 6


CROP DEVELOPMENT, YIELD, AND QUALITY DATA


1       HEADER
        1A    FILE NUMBER
        1B    PROVINCE
        1C    YEAR
        1D    PROJECT IDENTIFICATION NUMBER
        1E    AGENCY NUMBER
        1F    SUPERVISOR'S INITIALS
        1G    SAMPLE TYPE
        1H    PURPOSE
        1I    DATE
              1I1   DAY
              1I2   MONTH
```

```
         4H   MAJOR DAMAGE, PERCENTAGE
         4I   CAUSE
              4I1
              4I2
         4J   SIGNIFICANT DAMAGE, PERCENTAGE
         4K   CAUSE
              4K1
              4K2
         4L   DAMAGE ASSESSMENT TECHNIQUE, SUBJECTIVE OR MEASUREMENT

5    YIELD AND QUALITY SEGMENT
     5A   YIELD
     5B   MOISTURE CONTENT, PERCENTAGE, OVEN-DRY BASIS
     5C   NITROGEN, PERCENTAGE
     5D   PROTEIN, PERCENTAGE
     5E   ELEMENTAL ANALYSIS, PERCENTAGE
          5E1  P
          5E2  K
          5E3  S
          5E4  Ca
          5E5  Mg
     5F   TEST WEIGHT
          5F1  lb/bu
          5F2  g/0.5 L
     5G   WEIGHT, g/1000 KERNELS
     5H   PLUMP KERNELS, PERCENTAGE
     5I   GRADE

METHODS SEGMENT

14T3 YIELD
     14T31 UNITS BRITISH OR METRIC
     14T32 MOISTURE BASIS
14T4 NITROGEN AND PROTEIN, PERCENTAGE
     14T41 REPORTING BASIS
     14T42 MOISTURE BASIS
14T5 ELEMENTAL ANALYSIS
     14T51 REPORTING BASIS
     14T52 MOISTURE BASIS
```

Note: If numbers 2-5 are circled on the left hand side of the form, then the field names in the Methods Segment are 15-18 respectively.

```
6    ELEMENTAL ANALYSIS SEGMENT
     6A   ELEMENT 1
          6A1  SYMBOL
          6A2  CONCENTRATION
          6A3  UNITS
     6B   ELEMENT 2
          6B1  SYMBOL
          6B2  CONCENTRATION
          6B3  UNITS
     6C   ELEMENT 3
          6C1  SYMBOL
          6C2  CONCENTRATION
          6C3  UNITS
```

```
6D    ELEMENT 4
      6D1  SYMBOL
      6D2  CONCENTRATION
      6D3  UNITS
6E    ELEMENT 5
      6E1  SYMBOL
      6E2  CONCENTRATION
      6E3  UNITS
6F    ELEMENT 6
      6F1  SYMBOL
      6F2  CONCENTRATION
      6F3  UNITS
```

7   OILSEED ANALYSIS SEGMENT
      7A   OIL CONTENT, PERCENTAGE, DRY BASIS
      7B   IODINE VALUE
      7C   PROTEIN CONTENT, PERCENTAGE OF OIL-FREE MEAL
      7D   TOTAL CONTENT OF GLUCOSINOLATE IN OIL-FREE MEAL
      7E   ERUCIC ACID
      7F   ALLYLISOTHYOCYANATE mg/g

8   FEED ANALYSIS SEGMENT
      8A   DIGESTABLE DRY MATTER, PERCENTAGE
      8B   FAT, PERCENTAGE
      8C   FIBER, PERCENTAGE
      8D   ASH, PERCENTAGE

9   ENZYME ACTIVITY SEGMENT
      9A   ENZYME NAME
      9B   ACTIVITY
      9C   UNITS
      9D   ABBREVIATED METHOD OF ASSAY

RETRIEVAL NOTES

FOR CROP DAMAGE CODE (CAUSE) - CONVERSION OLD CODE TO NEW CODE

old code <10
(old code x10) + 10 = new code

APPENDIX E

PERFORMANCE/MANAGEMENT DATA KEYPUNCHING INSTRUCTIONS

This form consists of 50 pages (14 x 8.5) of which only 6 are of similar format. Of these, 4 pages are entirely free-format entries; 20 are entirely fixed-column positional entries; and the rest are a combination of these on the same page.

a)   Fixed-column Positional Entries

- Each page is self-defining. That is, all data to be keyed from it are on that page.

- All punched cards must start with the 13 to 23 columns of data normally found in the top left-hand corner of each page.

- The length of these "prefix" data and the number of cards vary from page to page.

- Key only the lines for which data are entered. The order in which the cards are keyed is unimportant.

b)   Free-format Entries (card type 04)

- Key only circled and box-filled entries on 6 or 12 column tab boundaries. Entries are of three types.

on form	keyed as	
C201**	'C201 '	6 columns
C601** + - 1 + +	'C601 +-1 ++'	12 columns
07 0 3 *	'07 03 '	6 columns

- Columns 1 to 15 are duplicated for each card required.

- Starting in column 16 up to 75, in any order, key as many entries as possible per card. Do not, however, split entries between cards.

- The *'s and unfilled boxes are keyed as blanks.
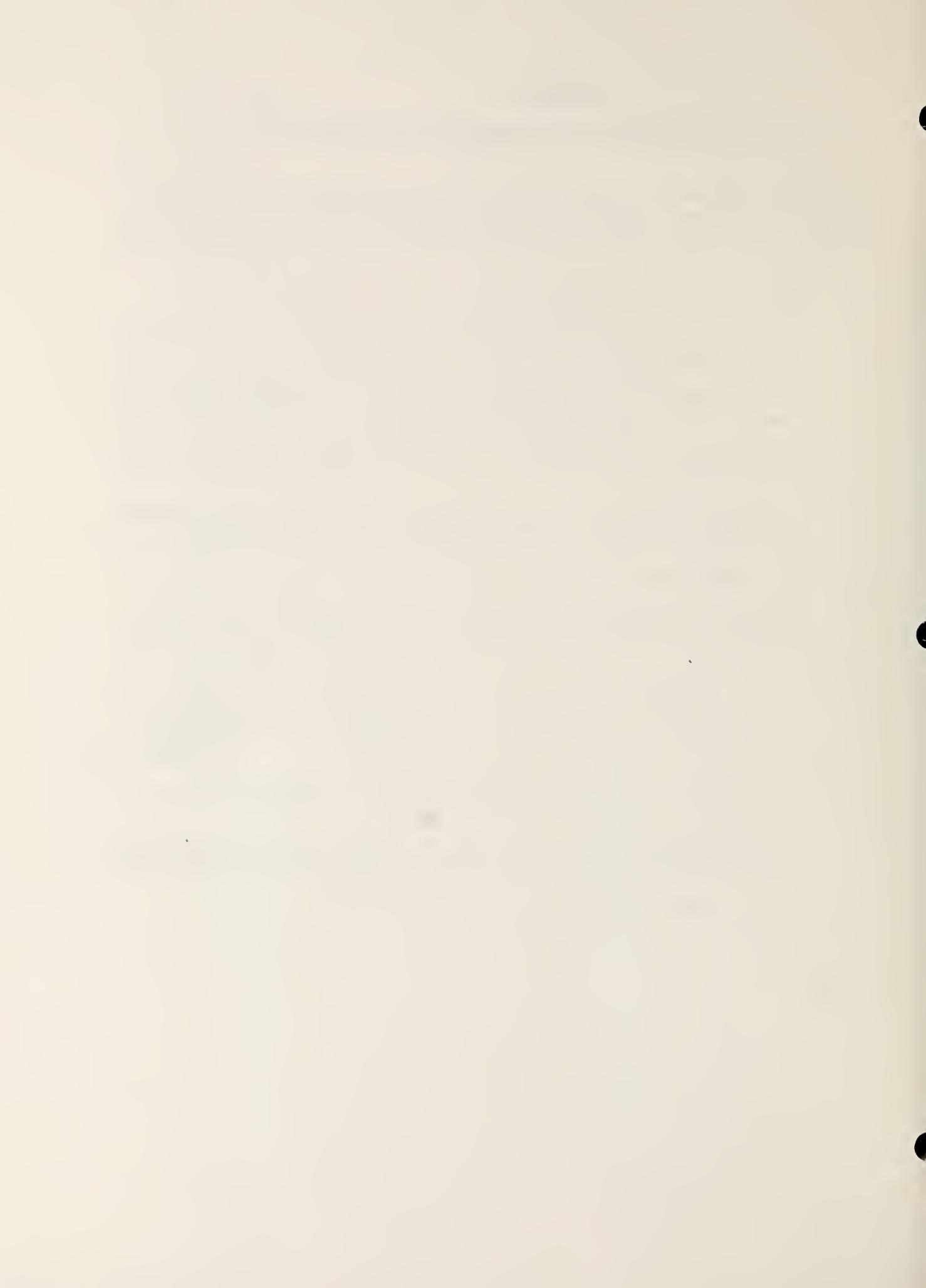
DUE DATE

JUL 2 3 1990			
	201-6503		Printed in USA